THE CONDITIONS OF ECONOMIC PROGRESS

BY

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"It cannot be that axioms established by argumentation can suffice for the discovery of new works, for the subtilty of Nature exceedeth many times over the subtilty of argument."

BACON, *Novum Organon*

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DEDICATED TO

WILLIAM FORGAN SMITH, LL.D.

PREMIER OF QUEENSLAND

A FAR-SEEING PATRON
OF ECONOMIC SCIENCE

INTRODUCTION

THIS book consists in essence of a comparative study of the investigations which have been made in all the principal countries into national income, and economic factors bearing upon national income. But instead of a series of monographs, country by country, on the results of studies of very varying value and scope, it was deemed to be more useful to subdivide the work by subjects. On the absolute levels of real income per head, on the extent of unused productive capacity, on the rates of growth of real income, and a series of other subjects, comparative data are therefore brought together for all the countries for which they are available, the results discussed, and some conclusions drawn. The title of the book indicates that throughout the studies have been oriented in such a direction as to give us as much information as possible on the matter which after all concerns us most — namely, to find the conditions under which we can hope for the greatest degree of economic progress in the future.

After a seven years' sojourn among the academic economists I have now returned to my old profession of public administration, and the latter part of this book has been written in the intervals of urgent official duties. I have left the academic world with nothing but regard for the intellectual integrity and public spirit of my former colleagues in the English Universities; but with dismay at their continued preference for the theoretical rather than the scientific approach to economic problems. Not one in a hundred — least of all those who are most anxious to proclaim the scientific nature of Economics — seems to understand what constitutes the scientific approach, namely, the careful systematisation of all observed facts, the framing of hypotheses from these facts, prediction of fresh conclusions on the basis of

these hypotheses, and the testing of these conclusions against further observed facts. It would be laughable, were it not tragic, to watch the stream of books and articles, attempting to solve the exceptionally complex problems of present-day economics by theoretical arguments, often without even a single reference to the observed facts of the situation. Worse still is the practice of basing a book upon theoretical arguments and then selecting a limited number of facts to illustrate the conclusions already reached, thus effectively putting the theoretical cart before the factual horse. The hard scientific discipline has yet to be learned, that all theories must be constantly tested and re-tested against observed facts, and those which prove wrong ruthlessly rejected.

Theory has a valuable, indeed an essential part to play in the development of economic science. But it must be theory which respects facts, not tries to supersede them. There is room for two or three economic theorists in each generation, not more. Only men of transcendental powers of reasoning can be candidates for these positions. Re-statements of economic theory, of which we are offered so many, are only occasionally needed, as factual knowledge advances and institutions change.

The rest of us should be economic scientists, content steadily to lay stone on stone in building the structure of ordered knowledge. Instead, it seems to be the ambition of nearly every teacher of economics to put his name to a new formulation of economic theory. The result is a vast output of literature of which, it is safe to say, scarcely a syllable will be read in fifty years' time. But the discovery of new facts, and of generalisations based on them, is work for all time.

To such an extent has this preoccupation with economic theory proceeded in English universities that even recently graduated research workers (from whom it can confidently be predicted that no valid contributions to economic theory will be obtained) are encouraged to pursue theoretical rather than factual investigations, and the limited funds available in England for the promotion

of economic research have largely been squandered in this direction.

Those in control of the Rockefeller Trust Funds for research in economics have, at any rate until recently, spent great sums in England in financing work of a purely theoretical nature. At the same time Professor Hall, as their representative, declined to give any assistance for investigations into national income. This subject, of central importance in what is supposed to be one of the most advanced countries of the world, has been left entirely to the unaided efforts of a single individual with a number of other duties to perform, the only clerical assistance available being that which he cared to pay himself.

In two countries with which I am acquainted, namely, Sweden and Australia, a different policy is being pursued. In both these countries economics is taught and studied as a subject which should be of practical benefit to the human race, and with a respect for observed facts in preference to long chains of theoretical reasoning. In both these countries, too, the beneficial results of this scientific attitude are already apparent, and will be increasingly so in the future.

Mr. J. M. Keynes, in reviving the Malthus-Ricardo controversy, has already called in the nineteenth century to redress the balance of the twentieth. But I should be inclined to go further back, and would say that economics was started on the right lines by Gregory King and Sir William Petty at the time of that astonishing flowering of the English scientific spirit in the later seventeenth century. The slowly growing science was twisted out of shape by Adam Smith and Ricardo, the argumentative Scot and the "stupid bothering stockbroker".[1] Professor Hogben has recently honoured Sir William Petty's work in the field of population by reviving his title "Political Arithmetic". In the field of economics, too,

[1] "The man was a stupid bothering stockbroker, with a head full of exchanges, per cents, turn of the market, biddings, loans, omnium, scrip, prices and shades" (William Cobbett in the *Political Register*, 20th September 1823).

I think we need to return to the tradition of these two brilliant pioneers, from whom even now we have much to learn.

I have drawn heavily on the work of economists and statisticians all over the world, and my intellectual indebtedness is very great; but particularly I should like to acknowledge the help which I have received personally, as well as from the works, of the following: Professor Bowley, Mr. J. M. Keynes, Mr. Cole and Professor Pigou in England; Professor Paul Douglas, Dr. Mordecai Ezekiel and Dr. Kuznetz in the U.S.A.; Dr. Walther Hoffmann in Germany; M. Dugé de Bernonville in France; Professor Tagliacarne in Italy; Professors Lindahl and Myrdal in Sweden; Herr Major Wright in Denmark; Professor Frisch in Norway; Dr. Nötel in Hungary; Dr. Vladimir Pertot in Jugoslavia; Professor Rao in India; Dr. R. Wilson, Mr. H. J. Goodes and Mr. J. G. Crawford in Australia; and Mr. J. W. Butcher and Mr. F. B. Stephens in New Zealand.

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Most of all I am indebted to my wife, who encouraged me to embark on this ambitious project four years ago. Without her continued inspiration and generous assistance it would never have been completed.

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Bureau of Industry
Brisbane, Australia
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SUMMARY AND CONCLUSIONS

Economics, in concerning itself only with those things which can be bought and sold for money, remains quite unmoved by the charge that it is neglecting the most important aspects of human life. Economics is a wide enough subject already without having to include the whole of philosophy, psychology, sociology and human biology in addition. Let economists get on with their work, and let the students of other social sciences get on with theirs.

When, therefore, we say that the average American enjoys greater economic welfare than the German, the German than the Italian, the Italian than the Indian, or present-day Europeans than their ancestors a century ago, we are perfectly well aware that the relative merits of these civilisations are not necessarily described by this economic ordering. A community making great economic progress may lack, and an economically unprogressive community may possess in full measure, the other values of life, such as a sense of contentment and of hope for the future.

Economic progress can be defined simply as an improvement in economic welfare. Economic welfare, following Pigou, can be defined in the first instance as an abundance of all these goods and services which are customarily exchanged for money. Leisure is an element in economic welfare, and more precisely we can define economic progress as the attaining of an increasing output of these goods and services for a minimum expenditure of effort, and of other scarce resources, both natural and artificial.

Two other elements have to be taken into account in assessing economic welfare. A productive system leading to great inequalities of income between one person and another, or to great instability of income, even if it produces a higher output of goods and services, should be regarded as creating less economic welfare than a system from which these features are absent. Unlike quantities of output, these two latter features cannot be measured or compared in uniform terms and qualitative judgment is necessary. They will be surveyed below.

Quantitative comparison can be made of the production of goods and services, or of what amounts to the same thing, namely real incomes produced per unit of labour, both between different times and different communities. Different communities, or people living in different times, consume different types of goods. Where these differences are very great, quantitative comparisons of real income become very approximate, but for moderate differences the formulae proposed by Professor Pigou make quantitative comparison possible. All such comparisons throughout this book are made in terms of what is defined as an "international unit" (referred to throughout as I.U.).

An international unit is defined as the amount of goods and services which could be purchased for $1 in the U.S.A. over the average of the decade 1925–34, or an amount interchangeable with them, as shown by the Pigou formula. For international comparisons of real incomes, the incomes are reduced to a 48-hour week basis by a simple proportion between the current prevailing working hours and 48.

This method of measurement of real incomes in different countries does not claim any metaphysical finality. It represents indeed the measurement of only part of economic welfare, which in itself is only part of well-being as a whole. But within the sphere of economic goods and services it represents the most reasonable measurement which can be obtained. (Chapter I.)

We may summarise the data about the level of real income in different countries by expressing the average real income in each country per head of the working population. (The ratio of working population to total population varies widely, and in any case output per head of the working population is the true measure of economic efficiency.)

Summarising these figures, the world is found to be a wretchedly poor place. An average real income per worker of 500 I.U. or less (in round figures a standard of living below £2 or $10 per week per breadwinner) is the lot of 81 per cent of the world's population. A standard of living of 1000 I.U. per worker per year or more is found only in U.S.A., Canada, Australia, New Zealand, Argentine, Great Britain and Switzerland, containing between them 10 per cent of the world's population. Another 9 per cent of the world's population is found in the principal industrial countries of Europe with an average real income per head between 500 and

1000 I.U. About 53 per cent of the world's population, including the whole populations of India and China, enjoys a real income per head of less than 200 I.U. Average real income per breadwinner in China and India is about 120 and 200 I.U. respectively.

The figures so far quoted represent income produced in the actual prevailing working hours which, in many cases, were much greater than 48 per week.

Stated in another way, the entire world's production of economic goods and services, averaged over the decade 1925–34, was 254 milliard I.U. per year. As much as 119 milliard I.U. of this was produced in the four largest economic units (U.S.A., Great Britain, Germany and France), containing between them only 13 per cent of the world's population. The other countries which may be called industrial countries, including Russia and Japan, contained 16 per cent of the world's population and produced a further 49 milliard I.U. of income. Two-thirds of the world's whole output of economically valuable goods and services was therefore produced in the so-called industrial countries containing less than one-third of the world's population, and nearly half of the world's whole output in four countries. (Chapter II.)

Oft-repeated phrases about poverty in the midst of plenty, and the problems of production having already been solved if only we understood the problems of distribution, turn out to be the most untruthful of all modern clichés. In the U.S.A. the highest level of real income per head of the working population so far attained was in 1929 with 1582 I.U. per head (on the basis of a 48-hour week). If all the industries of the U.S.A. had been working at full practical capacity (which would have involved extensive economic reorganisation), average income produced per head would have been 1905 I.U., and in 1937 about 2200 I.U. These figures are very modest compared with the fantastic statements sometimes made about the extent of unused productive capacity. Britain and Germany working at full productive capacity could have produced in 1937 approximately 1500 I.U. and 1000 I.U. per head respectively, while actually they produced 1275 and 828 I.U. per head respectively.

The under-utilisation of productive capacity is a question of considerable importance only in the U.S.A., though in certain recent years also it has been of some importance in Great Britain, Germany and France, but for most of the world it is entirely sub-

sidiary to the much more important fact that, with productive resources fully employed, they can produce so little. The age of plenty will still be a long while in coming.

The extent of non-utilisation of potential productive resources can be to some extent measured by figures of the proportion of the working population unemployed, bearing in mind that at a time when the economic system is working at full pressure there generally remain somewhere between 5 and 10 per cent unemployed due to occupational maldistribution. In the worst years of the last depression unemployment was over 30 per cent in Germany and the U.S.A., and in other industrial countries ranged from 9 to 22 per cent.

In 1937 it was 21 per cent in U.S.A. and about 24 per cent in France, and in other industrial countries ranged from 6 to 13 per cent. If preventable unemployment were eliminated throughout the trade cycle, this would mean a distinct improvement in the standard of living of the population of the U.S.A., but from the standpoint of the world as a whole it would only make a small contribution towards the much greater productive problem of raising the real incomes of the bulk of the world's population to anything like a civilised standard. (Chapter III.)

Very little attention has been devoted to ascertaining the causes of the tremendous differences in real income which prevail between different parts of the world. Conventional explanations in terms of natural resources are very wide of the mark. Our next step in attempting to get a grasp of this problem should be to examine the growth of real income in various countries over a long period of years, and the trends which have brought figures of real income to their present levels.

For this purpose, not only current levels of real income per head are expressed in international units, but the available information in each country about growth of real income per head is also re-expressed in terms of international units. Information in some cases is available as far back as 1850. Over long periods of time the figures naturally lose precision, but some striking general trends can be discerned.

One of the most striking features is that real income per head in the U.S.A. and Canada, which was rapidly rising up to about 1900, has since that date been virtually stationary. Between 1850 and 1900 the U.S.A. had much the highest real income per

head in the world with a fairly marked upward trend. During the last few years their level of real income per head has been overtaken by New Zealand, where the upward trend is very rapid, while in Great Britain progress, though it has slowed down since 1900, has continued, and Britain is now not far behind the U.S.A. Rapid progress since 1890 has also been shown by Switzerland and Australia.

In France economic progress appears to have been very rapid up to the beginning of the present century, to be followed by a period of complete stagnation. The German economy, for obvious reasons, showed a marked decline between 1913 and 1932, since which date there has been a rapid advance and the old upward trend has been resumed. The most rapid advance has been shown by Japan, which started the present century with a level about equal to that of China, and has risen very steeply to an average real income per head now about equivalent to that of Italy or Russia. Rapid and unbroken progress has also been shown by Sweden, in which country in the 1860's average real income per head was only about 150 I.U. Sweden has now overtaken all European countries except Britain and Switzerland. Norway also shows a rapid advance. Italy, also starting from a low level, has shown a moderately rapid advance between 1900 and 1928, followed by a recession. In Russia the upward trend has been exceedingly slow, and only in 1936 was the 1913 level of real income per head recovered.

Attention may first be devoted to the Malthusian or Neo-Malthusian theory that the trend of real income per head is inversely related to the rate of growth of population. Statistical examination leaves some fragments of this theory standing, but no more. The lowest rate of population increase over the period 1913 to 1930 was found in Czechoslovakia, France, Belgium and Austria. In Czechoslovakia there was a moderate increase in real income per head, while in the other three countries it was stationary or declining. At the same time in Canada, Norway, Sweden, Australia, Denmark and Japan substantial increases in the working population were accompanied by large increases in real income per head and reductions in working hours.

In predominantly agricultural countries something more like the Malthusian relationship holds. Large increases of population in Bulgaria, France, Finland and Russia have been accompanied by an unfavourable trend of real income, while the upward trend

of real income in Yugoslavia is possibly explained by a low rate of population growth. It is possible, though not very likely, that the comparative stationariness of real income per head in Germany and Holland were partly accounted for by a high rate of growth of adult population over this period.

Generally speaking, it is established that in industrial countries, or countries which have an opportunity of transferring a substantial proportion of their working population away from primary production, the Malthusian theory does not hold and, indeed, that its reverse may be true. Unfortunately it is in the industrial countries, where an upward trend of population is advantageous, that fertility rates have fallen so heavily; while in the agricultural countries, where an increasing population is economically disadvantageous, fertility remains high.

Some explanation must now be sought of the virtual cessation of economic progress in U.S.A. since 1900, and a marked slowing down of the rate of growth of a number of other industrial countries.

This explanation is easily found when we examine the trend of real income per head of the bread-winning population and real income per person *in work*. The latter figure has continued to advance. It has shown an uninterrupted and slightly accelerating advance, while a steadily increasing proportion of the working population has become unemployed.

Some powerful secular force, probably related to the investment and saving tendencies of the community, is acting to steadily keep down the level of achieved real income, while the potential real income, if all the working population were fully employed, continues to rise. Reductions in working hours act as a palliative of the situation. They do not appear to increase the achieved total of real income but they give leisure in a voluntary rather than a compulsory guise.

Only in the U.S.A. is the situation exactly as described above. It is found in a modified form in Great Britain, Germany, Canada and Norway, and probably also in France. In Australia, New Zealand and Sweden this tendency is not marked. In these countries actual real income has risen with potential real income, unemployment being at about the same level now as it was at the beginning of the century. (Chapter IV.)

Studying economic progress in relation to the economic structure of different countries, we find a very firmly established

generalisation that a high average level of real income per head is always associated with a high proportion of the working population engaged in tertiary industries. Primary industries are defined as agriculture, forestry and fishing ; secondary industries as manufacturing, mining and building ; the tertiary industries include commerce, transport, services and other economic activities. In the U.S.A., Canada, Great Britain, Australia and New Zealand, nearly half of the working population is engaged in tertiary industries ; in other European industrial countries and the Argentine, between 33 and 40 per cent. Low real income per head is always associated with a low proportion of the working population engaged in tertiary production and a high percentage in primary production, culminating in China, where 75-80 per cent of the population are primary producers. High average real income per head compels a large proportion of producers to engage in tertiary production even in countries which are supposed to be predominantly agricultural (Australia, New Zealand and the Argentine), where, in fact, only about 25 per cent of the working population are found to be engaged in primary production. The reasons for this growth of the relative number of tertiary producers must largely be sought on the demand side. As incomes rise (it will be shown below) the demand for such services increases, and being non-transportable they must be supplied by workers within the country concerned.

When we examine the trend through time, we find a similar result. In every case we find the proportion engaged in primary industry declining and in tertiary industry increasing. The proportion of the working population engaged in secondary industry appears in every country to rise to a maximum and then to begin falling, apparently indicating that each country reaches a stage of maximum industrialisation beyond which industry begins to decline relative to tertiary production. In the U.S.A. this maximum was shown in the Census of 1920, in Great Britain of 1901, in France of 1901, in Germany of 1925, in Canada of 1911, in Japan of 1920 and in Switzerland of 1910. In Australia, Italy and Denmark the maximum does not yet appear to have been reached.

Accompanying these industrial changes are substantial occupational and social changes, leading to a gradual elimination of the manual worker, particularly the unskilled, and the rapid growth of the numbers of clerical and professional workers. The

decline of agriculture tends to reduce the relative number of employers and independent workers, though the growth of tertiary industry tends to restore their relative importance. (Chapter V.) These large-scale movements of labour between industries and occupations, which economic progress continually demands, are accompanied by substantial movements of relative earnings. Low relative earnings in an industry encourage labour to leave that industry though, on the other hand, they may encourage employers to use more of that type of labour, and no exact result is predictable. In the U.S.A. relative earnings of farm workers have been declining heavily ; at the same time in the rapidly expanding clerical occupations there has also been a rapid decline in relative earnings over the last fifty years, and their average is now at or below that of factory workers. There is no doubt that the supply of such labour has been greatly augmented by wider educational facilities. The existence of these, together with natural preference for work of this type, might alone suffice to explain the fall in relative earnings. The wages of unskilled labour, relative to skilled, have been stationary, while there has been some relative upward trend in professional earnings, in spite of the greater availability of education previously mentioned. Presumably in this case the rapidly increasing demand is overtaking the supply.

In most countries the relative earnings of unskilled men increased relative to skilled between 1913 and 1920. Since 1920 the ratio has moved back, though in each case remains more favourable to the unskilled man than it was in 1913. This has been accompanied by serious occupational maldistribution in nearly all industrial countries, particularly the creation of an excess of unskilled workers. This is not altogether due, as might first appear, to the attraction of labour into unskilled work by the relative improvement of its wage rate. Professor Bowley's inquiries in England have shown that the probability of a boy entering unskilled labour is largely determined by his father's occupation, and the relative surplus of unskilled labour in all industrial countries can be accounted for by the preservation of the old social structure in the face of a declining demand for unskilled labour.

The closing of the margin between unskilled and skilled labour on the one hand, and between manual and clerical work on the other hand, is part of a general tendency towards equalisation of earnings which seems to prevail throughout the world. Examining wage

rates for a standardised list of skilled and unskilled occupations in different countries, we find a wide dispersion in the comparatively primitive countries, and a narrow dispersion in Western Europe, U.S.A. and Australia. Professor A. G. B. Fisher has pointed out that increasing opportunities for education will certainly narrow the dispersion of earnings in a community.

In the U.S.A., on the other hand, there is a wider dispersion between agricultural and urban wages than in any other country, and it still tends to widen. This is indicative of serious maladjustment and the existence of a big surplus of agricultural labour. Similar wide margins, in many cases tending to increase, are found in every country except Australia, New Zealand and some of the Baltic countries. The absence of a surplus of rural labour in Australia and New Zealand can be accounted for by the fact that they are recently settled countries and that agriculture has only been developed in fields which can yield a fairly high standard of rural earnings. (Chapter VI.) This impression is forcibly confirmed when we examine statistics of the quantity of primary production per worker engaged in primary industry. Adequate statistics are available for obtaining internationally comparable data of net output (i.e. exclusive of fertiliser and fodder consumption) of agricultural and pastoral industry for nineteen of the leading countries. Per male worker engaged, by far the highest outputs are found in New Zealand (2244 I.U.), Australia (1524 I.U.), Argentine (1233 I.U.), Uruguay (1000 I.U.). These are followed at some distance by the U.S.A. and Denmark (661 and 642 I.U. respectively), followed at a further interval by the principal European countries. In Poland production drops to 195 I.U., Japan to 120 and in Russia to 88. A comparable estimate for China is about 46 I.U. (The work of processing and distributing this food brings the value of real income per head, for purposes of international comparison, up to about 100 I.U. per worker.)

These results can be expressed in another way by saying that the labour of one male agriculturalist in New Zealand is sufficient to supply an optimum diet (as defined by Sir John Orr) to 40 people, in Australia to 25 people, in the Argentine to 20 people and in the U.S.A. to 11 people. In Great Britain or Germany it only suffices for 8 people, in Poland for 3 people, in Japan or Russia for 2 people or less. Bearing in mind that in most countries the ratio of workers to population is about 40 per cent, this means that,

in the progressive Australasian and South American countries, an average diet rather above the optimum, and requirements of agriculture and pastoral raw materials, can be met by the labour of about 15 per cent of the working population. If any larger proportion of the working population than this is employed in primary production, their output will have to be exported. In the European countries the provision of such requirements absorbs the labour of from 25 per cent of the working population (as in Holland or Denmark) to 50 per cent (as in Czechoslovakia). In Poland, on the other hand, such requirements would absorb the entire labour force of the country ; only the fact that the population consumes a diet two-thirds of the optimum releases any labour for secondary or tertiary production. In Japan and Russia the population in both cases consumes a diet only about 40 per cent of the optimum, thus releasing 50 per cent of the labour force (in the case of Japan) and about 25 per cent (in the case of Russia) for secondary and tertiary production.

Volume of production per unit of labour in primary industry has grown rapidly in all countries over the last sixty years, and generally as rapidly as in manufacturing industry. This is due partly to improvements in biological knowledge (particularly increased milk yield per cow) and partly to greater use of machinery. Gains from the use of machinery in agriculture are, however, often illusory, and in most countries of the world at present a further substitution of horses by machinery would not lead to any economic gain. Even in China, where return per unit of labour is now very low, machinery could only be economically introduced into the semi-arid land at present uncultivated. (Chapter VII.)

In secondary industry, figures of net production per worker engaged can be roughly converted into international units for comparison. The highest productivities are found in America and Canada, and much lower productivity in Europe. But the range here is not nearly so great as it is in primary production.

A detailed computation of real output per worker-hour in manufacturing industry in the U.S.A. shows a three-and-a-half-fold increase between 1870 and 1937. In Great Britain real output per worker-hour was about doubled in the sixty years preceding 1907, and increased by over 50 per cent between 1907 and 1936. A somewhat slower rate of increase was observed in Germany. In France, where a census of manufactures was first taken in 1840–45, real

output per worker appears to have increased sevenfold between that date and 1930.

The condition of economic progress in manufacturing industry is generally held to be the existence of increasing returns. As theoretically anticipated by Professor Allyn Young, high production per head is a function of increasing size of *industry* rather than increasing size of plant. A careful comparison of production statistics, industry by industry, in five countries showed no correlation whatever between average size of plant and high output per head; but examination over a long period of American and British production statistics shows that increases in production per head in any industry are largely dependent on the relative rate of growth of the industry as a whole. The increasing specialisation between firms thus made possible appears to be the most deep-lying cause of industrial progress. At the same time, inter-firm comparisons in British industry show that in only a limited number of industries is increasing size of firm accompanied by increasing output per head. Expanding industry, and increasing returns to labour, may actually be associated with declining average size of firm. (Chapter VIII.)

As half the working population of many countries is engaged in tertiary industry, the efficiency with which they do their work is a factor of prime importance in determining the average level of real income per head in those countries, and indeed it appears that the wealthier countries largely owe their position to high productivity per head in those industries. There is a wide range between different countries in this figure. This is borne out by an examination of the real costs of transport and retail distribution in different countries (services where direct international comparison is possible). In Great Britain, Germany and the U.S.A. there is evidence that the real productivity of these industries is improving, though at a much slower rate than in primary and secondary industry. (Chapter IX.)

These figures of productivity per head in different types of industry can now be assembled and combined to show the general average level of real income per head in the principal countries, now and at earlier dates, of which they are the cause. Economic progress clearly can be made by increasing production per head in the sphere of primary, secondary or tertiary industry; or by transferring labour from less to more productive spheres. In all

countries both of these have been of importance. In the U.S.A. primary production has always yielded an income per head much lower than in secondary or tertiary industry, and the transfer of labour out of primary production has contributed substantially to increasing the general level of real income per head. In tertiary industry productivity has been high throughout and the growth of the numbers engaged in it from 17 per cent of the working population in 1850 to 46 per cent in 1935 has been a substantial factor in raising the average real income per head of the community. Since 1920 average real income per head in tertiary industries has been rising strongly.

In Great Britain and Norway the transfer of population away from the comparatively unproductive agriculture assisted in raising the general average income per head. In Sweden, Italy and Japan also there was a transfer away from agriculture, but in this case income per head was also rising in agriculture. In France and Australia agricultural incomes per head, until recently, were higher than those of the rest of the community. Generally speaking, the main dynamic of economic advance has been rising income per head in either secondary or tertiary industry, often in both, and the transfer of population away from primary industry. (Chapter X.)

Attention is next turned to the question of whether the accumulation of capital is the most important factor enabling the growth of industries. Manufacturing industry is first separated out for investigation, and it is shown that a close functional relationship between output per head and the amount of capital per head, propounded by Professor P. H. Douglas, is substantiated in a number of countries. Further refinement of the formula is, however, necessary to allow for the operation of increasing returns, which appear to have been of predominant importance in the U.S.A. during the last twenty years though not at earlier periods.

Where P is the amount of production, C the amount of capital and L the amount of labour expended, the relationship is of a form

$$P = bL^{k}C^{1-k}.$$

b is a constant and $1-k$ is an important factor which is defined as the exponent of capital. For the U.S.A. it is found to be about 0·25, for Australia 0·3 and for New Zealand 0·48.

In the wider field of capital as a whole, rather than in manu-

facturing capital, a somewhat similar relationship appears to hold, though the data are not so precise. Our data in this case consist of time series of capital, labour and national income, and comparison between countries of capital and income per head.

The ratio of savings to national income can be studied for a fairly long period of years. In the case of Great Britain and U.S.A. it shows a downward tendency. The ratio is highest in Japan, where 22 per cent of a low income per head is saved, followed by Russia with 14 per cent. Savings are high in Germany, but do not bear the same ratio to national income as they did before 1913. In Australia, Holland and Switzerland the ratio of savings to national income is rising.

The exponent of capital in Professor Douglas's formula gives (it can be shown mathematically) the theoretical share which capital should obtain in the value of net output. In the case of manufacturing industries this supposition is found to be very closely borne out. In the sphere of production as a whole, the share of capital seems to be showing a downward trend in a number of countries, and in the U.S.A. has only averaged 13 per cent for the period 1919–34. In Britain and France the figure appears to have been stabilised at about 25 per cent.

Such statistics as are available of the composition of capital in different countries at different periods indicate that in the most primitive communities farm capital is first accumulated, followed by capital for railways. The next stage is the accumulation of industrial and commercial capital, but in the wealthiest communities the most important fraction of new accumulation is that which is in the form of buildings. Manufacturing industry as such soon reaches a stage where very little capital is required, and in future years in wealthy communities only housing and public utilities will offer an outlet for savings. (Chapter XI.)

The factors determining the share of capital in the national income have been discussed above ; but this does not necessarily determine the extent of inequality or equality of income distribution, one of the principal objects of our study. Equality or inequality of income distribution is measured by the Pareto coefficient, a low value indicating a tendency towards inequality and *vice versa*. This gives for recent years values of 1·68 for Great Britain, 1·72 for U.S.A., 1·94 for Denmark and 1·96 for Germany. The figure for Russia appears to be about the same as Germany,

while for Australia and New Zealand the figures are 2·25 and 2·21 respectively.

The lowest figure computed was for Great Britain in 1909 (1·31), almost exactly the same figure as prevailed a century earlier. Since then it has risen. In the U.S.A. the general trend has been towards greater equality of income, interrupted by a sharp contrary movement between 1921 and 1929. In Japan, income distribution has been becoming considerably more unequal since 1911.

Detailed analysis of income statistics for the U.S.A. and Denmark shows that the most important source of inequality of income is the large gains made by the purchase and sale of securities and other assets, the income from which is all concentrated on a small group of persons. This is a more important source of inequality than interest, interest than dividends, dividends than rents. In a community of wage and salary earners and farmers there is comparatively little inequality.

The flow of savings is exceedingly sensitive to changes in the personal distribution of income, as very large fractions of the high incomes are saved. (Chapter XII.)

There is a simple linear functional relationship (discovered by Allen and Bowley) between income and the amount spent on any given commodity. From this it is possible to calculate the income elasticity of demand for various commodities, or the additional amount which a community is likely to spend upon them as its income rises. For most of the staple foodstuffs income elasticity is very low even in comparatively poor countries, which is the basic factor determining the transfer of labour away from primary production as standards of living advance. Income elasticity of demand is, throughout the world, fairly high for clothing, furniture and miscellaneous consumption. In America in 1929 it appeared that income elasticity was less than 1 for all objects of expenditure except savings. It is clear that economic equilibrium can only be preserved with great difficulty in these circumstances. (Chapter XIII.)

The growth of world trade can be traced from its small beginnings in the seventeenth century to the present day. About the time of the Great Exhibition of 1851, the relative importance of Great Britain in world trade was at its maximum, at which date Britain did 30 per cent of the trade of the whole world. Interesting evidence is available to show that the great growth of British export

trade up to this period was at terms of trade increasingly disadvantageous to Great Britain; in other words, that the main benefits of the Industrial Revolution went to the consumer and not to the producer. Since 1851 the share of Britain in world trade has steadily declined and the terms of trade have, in general, been moving in favour of Great Britain and other manufacturing countries (with contrary movements in the 1870's and a stationary period between 1900 and 1914).

There is a curious relationship between movements of the terms of trade and the trade cycle. At the peak of the trade cycle (period of maximum employment) the terms of trade generally appear to be passing through either a minimum or a maximum.

During the last decade there has been a very violent movement of the terms of trade in favour of manufacturing countries. This has been associated with a decline in the volume of manufactured goods traded and an increase in the volume of foodstuffs and raw materials. Consumption within the country of production, however, is now the destiny of an increasing proportion of the output of foodstuffs, raw materials and manufactures. Since 1929 the previous upward trend of world trade has disappeared.

Empirical and theoretical reasons are advanced to show that the activity or otherwise of international lending determines both the terms of trade and the aggregate amount of world trade. Prior to 1929 the creditor countries were re-lending each year an amount a little short of their annual interest claims. In subsequent years this lending has completely ceased and indeed there has generally been a reflux of capital back to the creditor countries. To meet this situation the debtor countries have had to transfer resources extensively to export production, which appears to be the factor causing the movement of the terms of trade adverse to them. Reasons are advanced, however, for thinking that this period is now coming to an end and that the world may be entering upon another period of increasing world trade, rising commodity prices, and terms of trade more favourable to the primary producer. (Chapter XIV.)

The failure of achieved national income to rise as rapidly as productive capacity in the wealthier countries, particularly in the U.S.A., represents one of the most urgent present-day problems. Evidence from a large number of countries is available to show that there is a close functional relationship between national income

and the value of investment. This relation is linear and the slope of the line is defined as " the multiplier ". This multiplier can be deduced from empirical comparison of investment and national income, and it can be shown theoretically that it should also be deducible from data of the amount saved at different income levels. Similar results are obtained by both methods showing for the U.S.A. a multiplier of over 3, and for Great Britain and Germany of 2 or less. For a community to realise its full productive possibilities, there must be a level of investment sufficient to be in equilibrium with the national income thus produced, in accordance with the multiplier formula. General unemployment results if such investment is not forthcoming. In view of the rapid and fundamental changes in the nature of the demand for capital which have already been analysed in Chapter XI, it is not surprising that there has been failure to reach equilibrium. Low rates of interest, adjusted to make possible the absorption of the large amount of savings which the wealthy modern community can produce, become one of the main objects of economic policy. But the more equal distribution of incomes in the wealthier countries will ease such adjustment. In conclusion, we must again remind ourselves that, for the greater part of the world, and indeed ultimately for the wealthier countries too, the most important problem remains the problem of increasing productive capacity. In comparison with this, the under-utilisation of productive capacity is a local and temporary problem

CHAPTER I

THE PURPOSE OF ECONOMICS

"For then only will the economic and social order be soundly established and attain its ends, when it offers to all and each all those goods which the wealth and resources of nature, technique, and the social organisation of economic affairs can give."

The goods and services which come within the scope of economics are popularly described as material requirements, using the word "material" not in the literal sense (for much of the output and consumption with which economics has to deal consists of services rather than goods) but in the sense that people are willing to pay money for them, either as individual consumers, or, in the case of services supplied by public authorities, such as justice, defence and education, have expressed their willingness, through the machinery of government, to pay for them in their collective capacity. The scope of economics, therefore, is the production of and distribution of all goods and services which fall within this definition.

The securing of an abundant supply of these goods and services, though among the most important objects of economic science, is by no means the only object. We properly include among the objects of economic science the attaining of a just distribution of wealth between individuals and groups, and security of their livelihoods, the mitigation of economic fluctuations, and the increase of leisure, though recognising that these objects are sometimes inconsistent with each other, and that progress in one direction can only be made by sacrifice, or at any rate considerable diminution of potential progress, in another direction.

Conflict between these objects is by no means inevitable. Many economists are now of the opinion that

we can move simultaneously in the direction of a greater production of goods and services, greater equality of distribution and a steadying of economic fluctuations. The desire for greater leisure will of course conflict with the desire to increase output of goods and services; and security for particular individuals and groups is often incompatible with maintaining a full rate of economic progress. On these two issues, and on other conflicts between purposes which may arise, it is not the business of the economist to make a decision. It is the business of the community as a whole in its collective or political capacity. It is the duty of the economist to inform the community, carefully and objectively, of the gains and losses which will follow each decision. So long as he speaks in vague qualitative generalities he will not be heard. But it will be different when he can speak in precise quantitative terms.

If to all these questions economics is to give a scientific and quantitative answer, its foundations must be firmly built upon the ascertained facts of the production and distribution of goods and services. Only by the disciplined study of the facts of the present and the past can we make judgments upon the future; and no science has passed its apprenticeship until it is able to describe with confidence and accuracy the future consequences which will follow from present causes.

The current production of goods and services in each community, measured in a certain way, is referred to as its *real national income.*

For the definition of *real national income*, and the justification of the definition, I cannot do better than quote from Professor Pigou's *Economics of Welfare*:

> Generally speaking, economic causes act upon the economic welfare of any country, not directly, but through the making and using of that objective counterpart of economic welfare which economists call the national dividend or national income. Just as economic welfare is that part of total welfare which can be brought directly or indirectly into relation with a money measure, so the national dividend is that part of the objective income of

the community, including, of course, income derived from abroad, which can be measured in money. The two concepts, economic welfare and the national dividend, are thus co-ordinate, in such wise that any description of the content of one of them implies a corresponding description of the content of the other. The concept of economic welfare is essentially elastic. The same measure of elasticity belongs to the concept of the national dividend. It is only possible to define this concept precisely by introducing an arbitrary line into the continuum presented by nature. It is entirely plain that the national dividend is composed in the last resort of a number of objective services, some of which are embodied in commodities, while others are rendered direct. These things are most conveniently described as goods — whether immediately perishable or durable — and services, it being, of course, understood that a service that has already been counted in the form of the piano or loaf of bread, which it has helped to make, must not be counted again in its own right as a service. It is not, however, entirely plain *which part* of the stream of services, or goods and services, that flows annually into being, can usefully be included under the title of the national dividend. That is the question which has now to be discussed.

The answer which first suggests itself is that those goods and services should be included (double-counting, of course, being avoided), and only those, that are actually sold for money. This plan, it would seem, must place us in the best possible position for making use of the monetary measuring rod. Unfortunately, however, for the symmetry of this arrangement, some of the services which would be excluded under it are intimately connected, and even interwoven, with some of the included services. The bought and the unbought kinds do not differ from one another in any fundamental respect, and frequently an unbought service is transformed into a bought one, and *vice versa*. This leads to a number of violent paradoxes. Thus, if a man hires a house and furniture belonging to somebody else, the services he obtains from them enter into the national dividend, as we are here provisionally defining it, but if he receives the house and furniture as a gift and continues to occupy it, they do so no longer. Again, if a farmer sells the produce of his farm and buys the food he needs for his family in the market, a considerable amount of produce enters into the national dividend which would cease to enter into it if, instead of buying things in the market, he held back part of his own meat and vegetables and consumed them on the farm. Again, the philanthropic work done by unpaid organisers, Church workers and Sunday school teachers, the scientific work of disinterested experimenters, and the political work of many

among the leisured classes, which at present do not enter, or, when there is a nominal payment, enter at much less than their real worth, into the national dividend, would enter into it if those people undertook to pay salaries to one another. Thus, for example, the Act providing for the payment of members of Parliament increased the national dividend by services valued at some £250,000. Yet again, the services rendered by women enter into the dividend when they are rendered in exchange for wages, whether in the factory or in the home, but do not enter into it when they are rendered by mothers and wives gratuitously to their own families. Thus, if a man marries his housekeeper or his cook, the national dividend is diminished. These things are paradoxes. It is a paradox also that, when Poor Law or Factory Regulations divert women workers from factory work or paid home-work to unpaid home-work, in attendance on their children, preparation of the family meals, repair of the family clothes, thoughtful expenditure of housekeeping money, and so on, the national dividend, on our definition, suffers a loss against which there is to be set no compensating gain. It is a paradox, lastly, that the frequent desecration of natural beauty through the hunt for coal or gold, or through the more blatant forms of commercial advertisement, must, on our definition, leave the national dividend intact, though, if it had been practicable, as it is in some exceptional circumstances, to make a charge for viewing scenery, it would not have done so.

Reflection upon these objections makes it plain that they are of a type that could be urged in some degree against any definition of the national dividend except one that coincided in range with the whole annual flow of goods and services. But to adopt a definition so wide as that would be tantamount to abandoning dependence upon the measuring rod of money. We are bound, therefore, either to dispense altogether with any formal definition or to fall back upon a compromise. The former policy, though there is more to be said for it than is sometimes allowed, would certainly arouse distrust, even though it led to no confusion. The latter, therefore, seems on the whole to be preferable. I therefore include everything that people buy with money income, together with the services that a man obtains from a house owned and inhabited by himself. But "the services which a person renders to himself and those which he renders gratuitously to members of his family or friends; the benefits which he derives from using his own personal goods (such as furniture and clothes), or public property such as toll-free bridges, are not reckoned as parts of the national dividend, but are left to be accounted for separately."

The above conclusion does not complete the solution of our problem. Given the general class of things which are *relevant* to the national dividend, a further issue has to be faced. For the dividend may be conceived in two sharply contrasted ways: as the flow of goods and services which is *produced* during the year, or as the flow which passes during the year into the hands of ultimate consumers. Marshall adopts the former of these alternatives. He writes: "The labour and capital of the country, acting on its natural resources, produce annually a certain net aggregate of commodities, material and immaterial, including services of all kinds. This is the true net annual income or revenue of the country, or the national dividend". Naturally, since in every year plant and equipment wear out and decay, what is produced must mean what is produced on the whole when allowance has been made for this process of attrition. To make this clear, Marshall adds elsewhere: "If we look chiefly at the income of a country, we must allow for the depreciation of the sources from which it is derived". In concrete terms, his conception of the dividend includes an inventory of all the new things that are made, and of all the services not embodied in things that are made, and of all the services not embodied in things that are rendered, accompanied, as a negative element, by an inventory of all the decay and demolition that the stock of capital undergoes.

This definition carries with it certain plain implications as to the way in which that dividend must be evaluated. The first and most obvious of these is that, when the value of a finished product is counted, the value of materials employed in making that product must not be counted also.

Again, in so far as any sort of crop wastes the productive powers of the soil, the value of the dividend will fall short of the value of the aggregated net product by the cost of returning to the soil those chemical ingredients that it removes. Yet again, when minerals are dug out of the ground, a deduction should be made equal to the excess of the value which the minerals used during the year had in their original situation — theoretically represented by the royalties paid on their working — over the value which whatever is left of them possesses to the country after they have been used. If "using" means exporting in exchange for imports that are not used as capital, this latter value is zero.

It remains to consider the relation between the national dividend as thus evaluated — an addition, of course, being made for the value of income received from abroad — and the money income accruing to the community. On the face of things we should expect these two sums to be substantially equal, just as we should expect a man's receipts and his expenditure (including

investments) to be equal. With proper account-keeping this clearly ought to be so. In order that it may be so, however, it is necessary for the money income of the community to be so defined as to exclude all income that is obtained by one person as a gift against which no service entering into the inventory of the national dividend is rendered — all allowances, for example, received by children from their parents. In like manner, if A sells existing property or property rights to B for £1000, the £1000, if already counted as a part of B's income, must not be counted as a part of A's income also. These points are, of course, well understood. But certain further implications are less fully realised. Thus the incomes constituted by old-age pensions and special war pensions must be excluded; though ordinary civil service pensions are properly included, "because these may be said to be equivalent to salaries, and the pension system is only an alternative to paying a higher salary to those rendering existing services and leaving them to look after their own superannuation allowance". There must also be excluded all income received by native creditors of the State in interest on loans that have been employed "unproductively", i.e. in such a way that they do not, as loans to build railways would do, themselves lead to the production of services which are sold for money and thus enter into the national dividend as evaluated in money. This means that the income received as interest on war loan must be excluded. Nor is it possible to overthrow this conclusion by suggesting that the money spent on the war has really been "productive", because it indirectly prevented invasion and the destruction of material capital that is now producing goods sold for money; for whatever product war expenditure may have been responsible for in this way — and a similar argument applies to expenditure on school buildings — is already counted in the income earned by the material capital. Yet again, it would seem that income obtained by force or fraud, against which no real service has been rendered, ought not to be counted. There are, furthermore, certain difficulties about payments made to Government. The moneys that governing authorities, whether central or local, receive in net profits on services rendered by them, e.g. the profits of the Post Office or of a municipal tramway service, should clearly be counted. What the Treasury receives in income tax or death duties should, on the other hand, clearly not be counted, because this income, which has already been reckoned as such in private hands, is not passed to the Treasury in payment for any services rendered by it, but is merely transferred to it as an agent for the tax-payers. What the Treasury received in (the now abolished) excess-profit duty and corporation tax, as operated

in England, stands, however, on a different footing. It should be counted, because the incomes of companies and individuals were reckoned as what was left *after* these taxes had been paid, so that, if the income represented by them had not been counted when in the hands of the Treasury, it would not have been counted at all. Finally, the main part of what the Treasury receives in customs and excise duties ought, paradoxical as it may seem, to be counted, in spite of the fact that it is already counted when in the hands of the tax-payers and that it is not paid against any service. The reason is that the prices of the taxed articles are pushed up (we may suppose) by nearly the amount of the duties, and that, therefore, unless the aggregate money income of the country is reckoned in such a way that it is pushed up correspondingly, this aggregate money income divided by prices, that is to say, the real income of the country, would necessarily appear to be diminished by the imposition of these duties even though it were in fact the same as before.[1] When the nominal money income of the country has been "corrected" in these various ways, what is left should approximate fairly closely to the value of the national dividend (inclusive of incomes from abroad) estimated on the plan set out above.

The service obtained from the use of houses is therefore included in the national income, whether the house is rented by an occupier who pays money to the owner, or whether the owner lives in it himself. In the case of all other durable consumption goods, however, such as furniture, motor cars, books, cutlery and so forth, no "imputed income" is included. It may seem a little arbitrary to include houses and omit all these other utilities. It is clear, however, that a line has to be drawn somewhere, and we can at any rate say that the occupation of a house is a service customarily exchangeable for money, whereas that is only comparatively rarely the case with the use of furniture, motor cars, etc.[2]

[[1] The reason why it is only claimed that the main part, not the whole, of what the Treasury receives under this head should be counted as income is

(1) that commodity taxes may not always raise prices by their full amount, and

(2) that they may indirectly cause production to contract.]

[2] Nevertheless, in the most recent calculation of the national income of Sweden, prepared by Professor Lindahl and others, an interesting series of calculations, by Mr. Holmstedt, of the imputed income obtained from the stock of all durable goods of this nature has been included. The order of magnitude

Professor Marshall's exclusion of the services of public property such as "toll-free bridges" is generally accepted at any rate so far as the older countries are concerned, where in enjoying these services we are making use of capital goods produced in the remote past. In the case of newer countries, where such public property as bridges and roads has been produced with much toil and pain by the outlay of capital in comparatively recent times, on which capital interest and depreciation are still being paid, the situation is different. On the whole it is quite logical to include the annual value of the Sydney Harbour Bridge at cost price in the Australian national income, but to make no entry in the English national income for the annual value derived from the mediaeval bridge at Stratford-on-Avon.

Professor Pigou's distinction between real income produced and real income consumed may, and indeed must, be carried further in the case of countries engaging to any substantial degree in international trade. Two quite separate groups of considerations must be taken into account here. The first relates to the "terms of trade". If a country produces and exports substantial quantities of certain products and imports and consumes substantial quantities of certain other products, there are two quite separate methods of measuring the real national income. A figure of the quantity of goods and services produced, measured at standard prices, may give quite a different result from the figure of the quantity of goods and services consumed, also measured at the same standard prices. The amount of imports which the country obtains in return for a given volume of exports may vary very greatly from year to year, and thus the real income available for consumption may vary widely while the real income produced remains constant.

Quite a different consideration, though often interwoven with the problem of terms of trade, is the existence

of the imputed income thus obtained is small in comparison with that obtained from houses. Similar calculations for U.S.A. have also been made by Dr. King and the Brookings Institution and are commented upon below.

of international indebtedness. If the Government of a country, or public institutions or private companies within the country, are under an obligation to pay abroad certain sums as interest, this transaction will in general take the form of the export of certain goods and services without any corresponding imports being obtained. The same applies to dividends, profits and other property incomes claimed by foreign capital out of the country's annual produce. In the same way, in "creditor countries" there is an addition to money and to real national income in the shape of income earned abroad and belonging to the Government or citizens of the creditor country. In the case of countries where such receipts are substantial a distinction is often made between "total" and "home-produced" income. In the case of debtor countries the phrases "produced" and "available" income are used.

It is clear that the amount of real income paid by debtor countries and received by creditor countries will vary greatly with changes in the terms of trade, and a number of complex statistical problems arise in this connection. Difficult problems also arise in the case of certain inter-governmental transactions. Payments of reparations between 1924 and 1931 (or, as the German statisticians called them, *Tributleistungen*) may be regarded as having been of the same order as interest on overseas capital. In the case of various inter-governmental debt transactions during this period, some difficult points of definition arise as to which transactions should be included in national income.

In the working of exhaustible natural resources such as minerals and oil, some rough-and-ready allowance is sometimes but by no means always made. American income statistics contain a full allowance for amortisation of such assets. British income-tax regulations, however, allow no deduction for wasting natural assets. In the same way, the value of production of timber throughout the world is generally reckoned before charging the amortisation of the natural assets involved.

but on the other hand, the natural growth of forests is not generally reckoned in income. For certain countries, however, the quoted figures of national income require to be reduced for the effects of wasting of natural assets in minerals and timber.

This applies more strongly in the case of agriculture. No calculations have ever been made in any country as to the extent of exhaustion of natural fertility of soils and pastures. It is clear, however, that the methods of cultivation and pasturing of western and northern Europe, which have been carried on continuously for thousands of years, conserve the natural fertility of soils and pastures ; while it is equally clear that the methods of cultivation and pasturing carried on in many other parts of the world certainly do not. A recent estimate by the United States Department of Agriculture showed that the annual restoration of nitrogen to the soil in that country by the use of fertilisers only made up one-ninth of the amount annually abstracted by cultivation and pasture. In many parts of the United States, Canada and Australia soils and pastures have been indisputably destroyed by erosion. Even in some of the older settled agricultural countries such as North Africa, Spain and the hilly regions of India and China there are considerable grounds for believing that the methods of cultivation of the last few centuries have resulted in erosion and in serious progressive destruction of fertility.

Though it is unfortunately as yet impossible to give even the most approximate numerical valuation of the extent of this destruction of natural resources in different parts of the world, the reader must carry in his mind throughout very serious qualifications when examining all agricultural and pastoral statistics. In the case of mineral and timber production the extent of exhaustion of natural resources is probably trifling compared with that which arises in agriculture.

Purposive scientific generalisation differs from the meaningless accumulation of facts only in that the former uses the method of *comparison*. Comparisons of eco-

nomic welfare between one community and another, one economic group and another, and between one time and another, are the very framework of economic science. Anything which can be done to promote the scope and improve the technique of such comparisons is of fundamental importance. Certain modern theoretical economists have gone so far as to say that it is impossible to compare the level of income between two communities or between two individuals, or even between the same individual at different times; in other words, they deny the existence of any objectively measurable economic welfare (and incidentally provide themselves with a magnificent excuse for avoiding any study whatever of realistic and quantitative economics). I do not think that exponents of this view realise quite what an intellectual anarchy they will let loose if their theories are adopted. Deprive economics of the concept of welfare and what have you left? Nothing: except possibly the theory of the trade cycle, where all values may be capable of expression in money terms without the introduction of the concept of welfare. Even in this case you might be left in great doubts as to whether even the trade-cycle problem is worth solving.

There is a good deal of rather ignorant sophistication on this subject nowadays, but most of those who indulge in these views turn out in fact never to have read the relevant passages in *Economics of Welfare*, and for their benefit these are reprinted in the Appendix. In a brilliant piece of logical reasoning it is here (for the benefit of the sceptics) clearly shown that economic welfare can be compared between times and places, and that the best comparison, under conditions prevailing in the actual world, can be made by use of a so-called "Fisher" index number. The use of this formula can be illustrated from actual data. During the period 1925–34 the average income produced in America per head of the population in work was \$1397 per annum. The corresponding figure for Germany (taking the mark at par of exchange) was \$556. From the money value

it thus appears that average income produced per head in Germany was only 40 per cent of that in America. We cannot reach any conclusions, however, without taking account of the actual quantities of goods and services produced, or, in other words, what the money will buy. The average American over that period spent his income in a certain way, purchasing certain quantities of goods and services. If he had gone to Germany and had set out to purchase exactly the same goods and services, he would have found that they were 5·8 per cent cheaper in the aggregate than in his own country. The German with his income purchased certain goods and services, by no means in the same proportion as the American. He spent much less of his income on motor cars and rent, and much more on food. The German going to America and purchasing the goods and services which he was accustomed to consume would find that they were 17·9 per cent dearer. In comparing the real value of incomes in the two countries we must therefore allow something between 17·9 and 5·8 per cent for the difference in purchasing power of money. The ideal formula gives us the result that the comparative real income per head can be obtained from the geometrical mean of these two ratios, or

$$\frac{\text{Average real income in America}}{\text{Average real income in Germany}}$$
$$=\frac{\text{Average money income in America}}{\text{Average money income in Germany}}\sqrt{\frac{\text{Cost of American goods at German prices}}{\text{Cost of German goods at American prices}}}$$
$$=\frac{1397}{556}\times\frac{94{\cdot}2}{117{\cdot}9}$$
$$=2{\cdot}24.$$

The ratio is seen to be 2·24 as against the 2·5 which we obtained from a crude comparison of money incomes.

By the application of this and other index numbers we can make comparisons of economic welfare of different times, places and groups of people without in any case having to use any more elaborate formulae than the one given above. In some cases even simpler comparisons will, in the present state of knowledge, be all that are worth while attempting.

CHAPTER II

THE PRESENT LEVEL OF ECONOMIC WELFARE IN DIFFERENT COUNTRIES

OUR natural starting-point is to inquire into the average levels of real income which have been prevailing in different countries of the world during recent years. The data are in many cases only approximate, and we will not be in a position to make fine comparisons between the figures. There will be no need to. Even the most approximate analysis will reveal such astonishing differences between the level of prosperity prevailing in different parts of the modern world that detailed comparisons will be unnecessary.

For most countries of the world, during the last twenty years, sufficient information about national income has been published to make some sort of comparisons possible. The available data were reviewed very fully in a recent article by the present writer [1] to which reference should be made for full details. The sources and the methods of comparison adopted will, however, be restated below.[2]

In the first place, it is important to make sure that the definition of national income used means the same thing in all countries. We have defined national income above as the current production of goods and services in a community. For the U.S.A., Germany and Great Britain, an analysis of the definitions used in current publications was recently made by Dr. Marschak,[3] who

[1] *Weltwirtschaftliches Archiv*, January 1938.

[2] A further article in *Weltwirtschaftliches Archiv* (March 1939) on this subject, by Dr. Paul Jostock, has been received while this book is in the press. Dr. Jostock raises a number of important points in connection with the theory of national income, which will receive, it is to be hoped, wide consideration. Statistically, he is satisfied that the results given below represent the best use that can be made of the available information.

[3] *Econometrica*, vol. i. p. 373.

showed that the differences between them were small apart from two points specified below.

At one time a difference arose over the question of the inclusion of services in the national income. It was argued by Professor de Fellner in Hungary that the inclusion of, e.g., the value of domestic service (performed by paid domestic workers) in the national income was erroneous, on the ground that this would be a double counting of part of the income of their employers. Although this view was widely held in the past, it has not been followed in the computation of national income statistics in any other country in recent years, with the exception of Soviet Russia, where apparently Marxian economic theory compels the conclusion that non-material services such as medical and domestic service cannot be regarded as part of the national income. In the most recent Hungarian figures de Fellner's view is modified and certain services are included.

In practically every country now the services performed by the State and other public authorities are regarded as an element in national income. In Germany and Sweden, but in no other countries, an attempt has been made to separate those services such as roads and police, which are regarded as a necessary cost collectively incurred for the purpose of facilitating other production, from services such as health and education, which are regarded as creating new services for the consumer's satisfaction. The German statistics differ from those compiled in other countries, firstly, in that they include (as Professor Pigou recommends that national income statistics should include) the proceeds of all indirect taxation: and secondly, that they make a deduction for the cost of these services. The proceeds of indirect taxation are, in the calculations below, added to the national incomes of all countries, before comparisons are made. The German statisticians do not show how they distinguish these services from the other type of public services; and the Swedish investigators, when it comes to the point, use a very arbitrary division. To

support these practical objections, we have a theoretical objection stated by J. R. and U. K. Hicks (*Review of Economic Studies*, Feb. 1939). How do we draw the line between the value of services forming part of final output and the value of those services which ought to be deducted ? The distinction seems to be entirely arbitrary. Consequently, if we want to measure something and not to arrive at a figure for the national income which is what it is just because we say it is, it seems better to disregard this productive utilisation of public services, and to regard them (by definition) as being reckoned entirely into final output. To make the German and Swedish figures comparable with those of other countries, such costs are therefore added back. It is of interest to note that recent expenditure on armaments in Germany has not been treated by German statisticians as a cost necessarily incurred in the course of other productive activities, but as a capital investment.

The appreciation in value of capital assets and land must not be treated as an element in national income. Depreciation due to physical wear and tear and obsolescence must be treated as a charge against current income, but not the depreciation of the money value of an asset which has remained physically unchanged. Appreciation and depreciation of capital were included in the American statistics of national income prior to 1929, but now virtually the same convention has been adopted in all countries.

Agricultural produce consumed by farm families is included in national income at wholesale prices ; in the case of Poland and Eire, at retail prices. The latter is the correct procedure if we wish to make comparisons with other countries for which we have price data quoted at the retail stage, and the real incomes of certain agricultural countries may be slightly understated in consequence. In the case of India, China, Japan and Russia, the four countries in which such consumption is probably of the greatest relative importance, all food

consumption has been revalued item by item at British retail prices.

Interest on national debt, where the debt has been incurred for war purposes, should not be included, as the interest payment does not correspond to any element in current production. Where the national debt has been incurred for the purpose of providing services such as railways and roads the interest should not be excluded. The figures quoted for France, America and Italy did not exclude war debt interest and have been adjusted. For Great Britain and Germany war debt interest is excluded in the calculations quoted. For other countries the amounts involved are not a substantial fraction of the income.

The main comparison is made for the decade 1925–34. There were three separate reasons, all statistical, for choosing this decade. The first is that 1934 is the most recent year for which full figures can be obtained for a wide range of countries. The second is that this decade includes what may be regarded as an entire trade cycle, with about an equal proportion of boom and slump years. The third reason is that most countries took a census of population somewhere near the middle of this period, thereby giving us satisfactory figures of working population for comparison with the figures of real income.

Figures are not expressed per head of the population but per head of the working population. In different parts of the world the ratio of dependants to workers varies considerably, and figures of average income produced per head give a misleading impression. Thus, for instance, average real income produced per head of the working population is higher in Germany than in France. But per head of the population income is higher in France than in Germany, the simple reason being that the average age of the French population is much higher than the German, and the proportion of dependent children is smaller.

Quite a difficult point of definition arises in this case. The Census authorities in different countries have very

different methods of defining the size of the family-working population engaged in agriculture. In France, Germany and Russia, for instance, all adult family members of peasant households are regarded as being engaged in agriculture, while in the U.S.A. and Canada only women in actual receipt of wages are so regarded. In this case we have to cut the knot and exclude from the working population all females recorded as engaged in agriculture. In any case the proportion of actual agricultural wage-workers among women is small and the inaccuracy introduced is not very great. In other respects the methods used by the Census authorities in different countries seem now to be comparable enough.

To reduce figures to a comparable value of money it is necessary to have a comparable price index indicative of the relative prices of different goods and services in different countries. It is not sufficient to base the comparison on food prices alone, as has been done in the past by the International Labour Office, firstly, because only a limited proportion of incomes are spent on foodstuffs; and secondly, it often happens that countries where food prices are low have high prices for other commodities, and *vice versa*.

Information was obtained from International Labour Office publications regarding relative prices of food and house rent and fuel in different countries. For clothing and a number of other goods and services use was made of two inquiries published by the Unilever Company and the Ford Company in 1930 and 1932 respectively. In order to redress the balance, somewhat overweighted with figures relating to the prices of the necessaries of life, information about the prices of a number of luxury goods in different countries was obtained from a special investigation conducted by the American firm of Schwedersky & Deutschbein.

In order to apply the correct formula for comparing the purchasing power of money in different countries, it was necessary to find the average distribution of expenditure between different fields of the inhabitants

of the countries concerned. Such information was available in full for six of the principal countries, namely, U.S.A., Great Britain, Canada, Germany, Sweden and Eire. For other countries approximate data were used. The full details of the calculation are given in the original publication.

Below are given figures and sources of all available information on the subject of national incomes collected during recent years, including some very approximate figures. The author has derived great help from a number of previous compilations, particularly the following :

Wirtschaftliche Kräfte der Welt, published by the Dresdner Bank in 1930. This gives some data for nearly every country in the world, but there is no criticism or discussion of comparability. Many of the estimates were specially calculated by the Bank. (Referred to below as " Dresdner Bank ".)

Tabulation by Dr. H. W. Fisk, *American Economic Review*, 1930. Dr. Fisk took especial pains to secure comparability, and only included figures in his table after individual correspondence with the compiler of each datum. (Referred to below as " Fisk ".)

World Economic Survey, published by the League of Nations. Since 1933 the annual issues of this publication have given all the information available up to date on national incomes in different countries. (Referred to below as " L. of N.")

Undersökningar rorande det Samlade Skattetryket i Sverige och Utlandet, by Professor Lindahl, published by the Swedish Ministry of Finance, 1936. (Referred to below as " Lindahl ".)

The above sources have been used in compiling the following list, but in every case where it was possible reference was made back to the original source, and, as is seen, the majority of the data below are quoted from original sources.

It is not feasible to attempt to compute probable errors in the data for the different countries, but it may

be of some value to attempt a qualitative[1] estimate of the statistical accuracy of the national income figures for the different countries, and they are divided into the following categories:

Class I. Based on accurate taxation or production Census statistics.

Class II. As above, but with some defects or deficiences.

Class III. Approximate estimates.

Class IV. Very rough estimates.

Where income figures are not available over the whole period 1925–34 but only for particular years, they are extrapolated by use of figures of industrial and agricultural production or other information which may be available.

The figures are all calculated in terms of dollars at the parity of exchange prevailing in 1929 (except for Japan and Spain, where the 1930 parities are taken).

In nearly every case a more detailed analysis is given later, and these figures are only used for a first comparison of totals.

EGYPT.—£1 Egyptian = \$4·991. Dresdner Bank (1926) and Fisk (1928) quote identical data. National Income, \$1430 m. Class IV.

SOUTH AFRICA.—£1 = \$4·867. Official estimate for 1923. National Income, \$905 m. Class II.

CANADA.—Official estimate prepared by Dr. Cudmore, published in brochure *The National Income of Canada* (Dominion Bureau of Statistics) for 1930. Data for 1925–29 and 1931–34 estimated on p. 112 below. National Income average of 1925–34, \$4270 m. Class I.

U.S.A.—Calculations by Dr. Kuznets in *National Income and Capital Formation, 1919–1935*, published by National Bureau of Economic Research. Average National Income, 1925–34 (after deducting \$720 m. for National Debt interest), \$64,390 m. Class I.

[1] The very difficult task of fixing numerical values for probable percentage errors is attempted in a few cases by Dr. Jostock (*loc. cit.*). For countries which I have placed in Class I he appears to suggest a probable error of under 5 per cent; Class II, of 5 to 10 per cent; Class III, of 10 to 20 per cent; and Class IV, of over 20 per cent.

ARGENTINE.—1 peso = $0·4245. Estimate by Bunge for 1916 quoted by Dresdner Bank. National Income, $2550 m. Class IV.

BRAZIL.—1 milreis = $0·1196. Two conflicting estimates for 1927 and 1928 quoted by Dresdner Bank. Average National Income, $1467 m. Class IV.

CHILE.—1 peso = $0·1217. Fisk (1928). National Income, $665 m. Class III.

BRITISH INDIA.—1 rupee = $0·3650. Calculations by Dr V. K R V. Rao, for 1931–32 analysed below Class III.

JAPAN.—1 yen = $0·4985. *Mitsubishi Economic Research Bureau Monthly Circular*, March 1934, quotes calculations by Professor Hijkata up to 1931, brought up to date by means of index numbers to 1933. A similar calculation can be made for 1934. (See p. 117 below.) National Income, 1925–34, $5758 m. Class II.

DUTCH INDIES.—1 gulden = $0·4020. Dresdner Bank for 1924. $834 m. Class IV.

PALESTINE.—(Currency on British basis). *Economic Research Institute of the Jewish Agency* estimate £35·9 m. for 1936.

TURKEY—1 pound = $4·396. Official estimates quoted in *Tax Systems of the World* give £T1000 m. for 1929 and £T1150 m. for 1934. Class IV.

GERMANY.—1 Rm. = $0·2382. *Statistisches Jahrbuch*, with addition for public services excluded. Inclusive of indirect taxation. National Income 1925–34, $15,157 m. Class I.

AUSTRIA.—1 schilling = $0·1407. Scattered estimates. Dresdner Bank quotes League of Nations (1925), $1025 m.; Jacobsen (1928), $1050 m.; Fisk (1927) gives $940 m. The German Institut für Konjunkturforschung (*Bulletin*, 6th April 1938) estimates National Income on the basis of taxable income + 25 per cent at $1020 m. for 1929 and $881 m. average for 1930–34. Assumed average for 1925–34, $940 m. Class III.

BELGIUM.—1 belga = $0·1390. Lindahl quotes (at the above rate of exchange) $862 m. for 1925, $1352 m. for 1927, $1847 m. for 1930. This was a period of rapid price change, and re-expressed at 1925–34 prices they become $1220 m., $1290 m. and $1560 m. respectively, averaging $1357 m. The index number of industrial production averaged 115·6 for these three years and 110·1 for the other seven years of the period, so the average income for 1925–34, at prices prevailing over the average of that decade, may be put at $1310 m. Class III.

BULGARIA.—1 leva = 0·7224 cent. Woytinski in *The Social Consequences of the Economic Depression* quotes estimates by Kiranoff for 1929 and 1932 of $380 m. and $226 m. respectively. Tschaka-

loff (*Institute for Economic Research*, Sofia University, 1937, vol. 2) gives figures for 1924–35. Dresdner Bank quotes \$333 m. for 1926. Based mainly on Tschakaloff's figures, an estimate of \$325 m. is made for the average of the period 1925–34. Class III.

DENMARK.—1 krone = \$0·2680. Lindahl, \$980 m. Class I.

SPAIN.—1 peseta in 1930 = \$0·117. A detailed estimate for 1923 was prepared by Vandellos (*Metron*, 1925), and an approximate estimate for 1930 is quoted by Beckerath (*Weltwirtschaftliches Archiv*, July 1931) without details, of \$2875 m. and \$3220 m. respectively. Class IV.

ESTONIA.—1 kr. = \$0·268. Dresdner Bank, \$95 m. for 1928. Official records are available of the value of both agricultural and industrial output, from which a figure of virtually the same amount is calculated for the period 1925–34. Class I.

FINLAND.—1 mark = 2·519 cents. For the six years 1926, 1928, 1929, 1931, 1933, 1934 Lindahl quotes an average of \$412 m. Agricultural and industrial output added together averaged 16·7 milliards in these six years and 15·9 milliards in the remaining four years. For 1925–34 the average can be put at \$404 m. Class II.

FRANCE.—1 franc = 3·918 cents. Estimates by L. Dugé de Bernonville,[1] *Revue d'Économie Politique*, May-June 1935. Excluding 12·9 milliard francs war-debt interest, the average National Income over the period 1925–34 is \$7785 m. Class II.

GREECE.—1 drachma = 1·298 cents. Rediadis (*Metron*, 1929–30) gives a detailed estimate for 1929. Data from which Greek National Income for 1924 and 1934 can be calculated are given by Nicolaides in *Grèce: L'Effort des Dix Ans* (Comité Hellénique de Chambre de Commerce Internationale, Paris, 1935). For these three years, taken as representative of the decade, the average is \$436 m. Class III.

HUNGARY.[2]—Institut für Wirtschaftsforschung, *Magyarorszag nemzeti jovedelme 1924–25: 1934–35*, by Matolcsy and Varga. Measured at 1924–27 prices, average 1925–34, \$955 m. Class I.

EIRE.—£1 = \$4·867. Figures for 1929–35 quoted in Report of

[1] Dr Jostock (*loc. cit.*) suggests that this figure may be too low by 10 per cent owing to omission of public authorities' income, certain livestock products and tax evasion. The first item, accounting for more than half of Dr. Jostock's estimated deficiency, is brought into account below by being included with indirect taxes, leaving a possible deficiency of less than 5 per cent.

[2] In this country the imputed value of the labour of housewives has been included, but all other service incomes, representing the labour of 237,000 persons, have been excluded. These two quantities are of the same order of magnitude and are assumed to balance.

Banking Commission. 1925–28 assumed to be at 1929 level and £10 m. deducted for depreciation not allowed for. Average 1925–34 $702 m. Class II.

ITALY.—1 lira = 5·263 cents. Gini (quoted by *World Economic Survey*) gives $4975 m. for 1928 and $3425 m. for 1931. Meliado (*Metron*, 1931–32) gives a similar estimate for 1928 No satisfactory data are available for the other years and an average of $4200 m. is assumed for 1925–34. Class III.

LATVIA.—1 lat = $0·193. Data from Dresdner Bank (1925–26 and 1928) and *World Economic Survey* (1929 and 1932). Average for 1925–34 assumed $178 m.

LITHUANIA.—1 lit = $0·100. Dresdner Bank 1928, Fisk 1924, average $146 m. Class IV.

NORWAY.—1 kr. = $0·268. Lindahl 1925–34, $676 m. Class I.

HOLLAND.—1 gulden = $0·402. Lindahl quotes definite figures for 1929 and 1934; figures for other years based on extrapolations. Average 1925–34, $1962 m. Class II.

POLAND.—1 zloty = $0·1122. Official estimates, based on consumption data for town and rural population, at retail 1929 prices, published in *Polish Statistical Year Book* for 1929 and 1933. Estimates for the whole period 1925–34 are made from the statistics of agricultural and industrial output, which are very complete. Average National Income 1925–34 at 1929 prices, $2748 m. Class III.

ROUMANIA.—1 leu = 0·5982 cent. *World Economic Survey* gives data from 1929 to 1933, from which an extrapolation can be made to cover the whole period, as annual data are available for the value of crops and of industrial output. Average 1925–34, $868 m Class III.

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND.—£1 = $4·867. Data from Colin Clark, *National Income and Outlay* (London, 1937), inclusive of indirect taxation. Average 1925–34, $20,372 m. Class I.

SWEDEN.—1 kr. = $0·268. *National Income of Sweden*, by Lindahl and others. Average 1925–34, including indirect taxes, $1875 m. Class I.

SWITZERLAND.—1 fr. = $0·193. Marschak and Lederer in *Kapitalbildung* (London, 1937) quote an estimate by Wyler for 1924, which they bring up to date to 1930 by means of wage and profit statistics. Lindahl quotes two very rough estimates by Obrecht for 1929 and 1934. Very approximate average for 1925–34, $1722 m. Class IV.

CZECHOSLOVAKIA.—1 kr. = 2·963 cents. Fisk and Dresdner Bank quote figures for 1925–27 averaging $2015 m. Real income figures are later brought up to date by use of index figure of industrial production.[1] Class IV.

AUSTRALIA.—£1 = $4·867 Data from Crawford and Clark, *National Income of Australia.* Available real income after deduction of interest payments due oversea, measured at 1923–27 prices and then converted to international units, $2543 m. for 1925–34, including indirect taxation. Class I.

NEW ZEALAND.—£1 = $4·867. Calculated from data in possession of the author. National Income produced after deduction of oversea interest, $751 m. Class II.

U.S S.R.—From *Critique of Russian Statistics*, by the present author, all goods and services produced in the U.S.S.R. in 1928 and 1934 being revalued at sterling prices, amounting to $13,710 m. and $16,050 m. respectively. Class III.

PORTUGAL.—1 escudo = 4·424 cents. Data given by Vandellos (see Spain above) for 1914, and calculated for 1925–34 on the assumption that the Spanish rate of increase has prevailed, at $567 m. Class IV.

JUGOSLAVIA.—See below, p. 134. Average 1925–34, $1320 m. Class IV.

Figures obtained above for Argentine, Brazil, Chile, British India and Dutch East Indies are insufficient to do more than to establish rough orders of magnitude. For a number of other countries still more approximate orders of magnitude can be obtained from data as to prevailing wage rates, which, in the case of the more primitive parts of the world, is all the information generally available. A figure for China, which has a lower standard of real income than that known for any other part of the world, can, however, be established by two or three different methods. Probable error in these cases may be 50 per cent or even higher : but even so these figures yield some very interesting conclusions.

Real income is expressed in form of international units per head of the working population, henceforward referred to as I.U.'s. *An international unit is defined as the amount of goods and services which one dollar would*

[1] Figures quoted by *Tax Systems of the World* of Czechoslovak national income at 90 millions kr. in 1929 and 50 md. in 1935 give a very similar result.

Land	National Income: From Sources: Period	National Income: From Sources: $'s million	National Income: Including Indirect Taxes, 1925–34: $'s million	National Income: In International Units: Period	National Income: In International Units: $'s million	Working Population: Census Year	Working Population: Total Numbers (1000's): Including Women employed in Agriculture	Working Population: Total Numbers (1000's): Excluding Women employed in Agriculture	Working Population: Reduced to 1930 Population	Real Income per Head of Occupied Population in International Units
South Africa	1923	905	955	1923	765	..	.	..	About 3,200	276
	..	.	.	1925–34	883	..	.	..		
Canada	1925–34	4,270	4,488	1925–34	5,084	1931	3,925	3,900	3,800	1337
United States	1925–34	64,390	66,203	1925–34	66,203	1930	48,830	47,914	47,914	1381
Germany	1925–34	..	15,157	1925–34	17,580	1933	32,296	27,647	27,220	646
Austria	1925–34	940	1,040	1925–34	1,613	1934	3,170	2,840	2,822	572
Belgium	1925–34	1,310	1,420	1925–34	2,033	1920	3,232	3,102	3,386	600
Bulgaria	1925–34	325	347	1925–34	524	1926	3,045	1,753	1,843	284
Denmark	1925–34	980	1,051	1925–34	1,008	1930	1,606	1,483	1,483	680
Estonia	1928	95	106	..	..	..	..	..	.	.
	1925–34	95	.	1925–34	142	1922	624	411	416	341
Finland	1925–34	404	444	1925–34	473	1930	1,715	1,242	1,242	380
France	1925–34	7 785	8,790	1925–34	12 480	1931	21,612	18,418	18,240	684
Greece	1924, 1929, 1934	436	494	1924, 1929, 1934	922	1928	2,746	2,278	2,320	397
Hungary	1925–34	955	1,077	1925–34	1,205	1930	3,828	3,357	3,357	359
Eire	1925–34	702	799	1925–34	829	1926	1,308	1,186	1,177	705
Italy	1928, 1931	4,200	4,773	1928, 1931	5,320	1931	17,262	15,723	15,520	343
Latvia.	1925–34	178	195	1925–34	249	1925	1,105	703	722	345
Lithuania	1924–28	146	159	1924–28	190	1923	1,372	796	918	207
Norway	1925–34	676	727	1925–34	607	1930	1,167	1,126	1,126	539
Netherlands	1925–34	1,962	2,065	1925–34	2,624	1930	3,185	3,075	3,075	855
Poland	1925–34	.	2,748	1925–34	3,428	1921	13,475	8,353	9,770	352
Roumania	1925–34	868	974	1925–34	1,471	.		.	About 6,050	243
Great Britain	1925–34	..	20,372	1925–34	21,854	1931	21,625	21,539	21,460	1069
Sweden	1925–34	..	1,875	1925–34	1,731	1930	2,892	2,650	2,650	653
Switzerland	1925–34	1,722	1,788	1925–34	1,917	1930	1,933	1,882	1,882	1018
Czechoslovakia	1925–27	2,015	2,125	1925–27	2,815	1930	7,000	5,900	5,900	455
				1925–34	2,680	..	.	.	.	
Australia	1925–34	2,900	3,205	1925–34	2,543	1933	2,698	2,678	2,596	980
New Zealand	1925–34	751	827	1925–34	691	1926	552	548	575	1202
U.S.S R (sterling prices)	1928	13,710	..	1928	14,710	.	.	51,300	.	287
	1934	16,050	..	1934	17,230	..	..	60,900	..	283
Portugal (very approximate)	1925–34	567	620		839	..	..	..	2,450	342
Yugoslavia	1925–34	1,320	1,495		1,352	..	.	..	4,100	330

purchase in the U.S.A. over the average of the period 1925–1934 and all data are reduced to this standard. The further we get away from U.S.A. of this decade either in time or in the level of economic development, the less precise does our measurement become ; but this appears to be the most satisfactory choice of unit for the modern world.

For the countries for which an accurate computation can be obtained, the following are the figures of average real income per head in international units over the period 1925–34 :

U.S.A.	1381	Czechoslovakia	455
Canada	1337	Greece	397
New Zealand	1202	Finland	380
Great Britain	1069	Hungary	359
Switzerland	1018	Japan	353
Australia	980	Poland	352
Netherlands	855	Latvia	345
Eire	707	Italy	343
France	684	Estonia	341
Denmark	680	Yugoslavia	330
Sweden	653	U.S.S.R.	320
Germany	646	South Africa	276
Belgium	600	Bulgaria	259
Norway	539	Roumania	243
Austria	511	Lithuania	207

The order of these countries was perhaps not unexpected, though the range of the figures is certainly rather wide. The high position occupied by Eire is interesting. Of continental European countries Switzerland and Holland hold the highest position, though in both of these the real income has deteriorated during recent years. The very low position occupied by Italy is also striking. Speaking in round figures, it can be said that Italy, Japan, Soviet Russia, Poland and the Baltic countries are all at approximately the same level of economic development.

The high figure for the U.S.A. is associated with an extraordinary heterogeneity within the boundaries of that state. In 1929 [1] income per head of the population

[1] *America's Capacity to Consume*, Brookings Institution, p. 174.

(occupied and unoccupied taken together) averaged \$699 for the whole of the U.S.A. The figures for the States revealed a range from \$1208 in New York and \$1019 in California to figures of \$337 in Georgia, \$335 in Tennessee, \$325 in Alabama, \$313 in North Carolina, \$308 in Arkansas, \$286 in Mississippi and \$258 in South Carolina.

For the following countries we have approximate orders of magnitude :

Egypt . . .	300-350	British India . .	200
Argentine . .	1000	China . . .	100-120
Brazil . . .	400-500	Spain . . .	500-600
Chili . . .	500-600	Portugal . . .	300-400

Indian National Income and Reduction to Sterling Equivalent

In *National Income of British India*, Professor V. K. R. V. Rao reaches a final estimate of national income of Rs. 17,664 millions in 1931–32. Professor Findlay Shirras in *Science of Public Finance* (London, 1936) gives average Indian national income over the period 1926–33, measured at 1926–27 prices, at Rs. 27,850 millions, or Rs. 17,600 millions at 1931–32 prices (converting by means of the Calcutta wholesale price index number). These, however, refer to all India, including the Native States, and thus appear to be about 20 per cent below Professor Rao's result. This latter has been adjusted for understatement of agricultural output and of taxable income and is used in the subsequent calculations. Professor Rao's figures excluded the Native States and Principalities, which contained 23 per cent of the population. The working population engaged in the production of this income was 98·7 millions, including the " equivalents " of working dependants and subsidiary occupations. If we exclude altogether women recorded as engaged in agriculture (whether as principal workers or as working dependants) to obtain comparability with the figures of other countries, the number of occupied persons falls to 88 millions.

A substantial proportion of the real income of India is represented by the consumption of primary foodstuffs, which may be directly re-valued at British retail prices of 1934. The year 1934 is chosen to obtain comparability with Sir John Orr's survey of British nutrition in that year, and with other countries for which similar calculations have been made. The quantities of food available for consumption are given in Dr. Dao's article in *Sankhya*, Vol 4, Part II.

	Rice	Wheat and Other Grains	Sugar	Milk	Meat	Fish	Vegetable Oils	Vegetables	Fruits	Total
*Net quantity available for human consumption 1000 tons	16,373	20,650†	3988	16,071	378	1809	874	9375	8929	
Equivalent value, Great Britain, 1934, 7d per lb.	2 08	1 75†	2 5	2 47	10 5	6 2	5·5‡	1 28	5 3	.
Sterling value £ millions	318	337	93	370	37	105	45	112	442	1850
Value at which included in statistics of Indian agricultural production —rupees millions .	2,366	1,363	529	3,000	150	130	328	←745→		8611

* Excluding exports and consumption by cattle Grain stated on a husked basis.
† Average retail price of flour Grain consumption is converted to a flour basis.
‡ Retail price of margarine

We thus see that Rs. 8,611 millions, represented the value, at farm, of food consumed by the Indian population. The calculations in the above tables, however, are based on the unrevised estimates of the quantities of food production, and in the revised estimates Professor Rao has increased the totals by Rs 600 millions; the rupee value of food consumption may therefore be taken at Rs. 9,211 millions and its sterling value as £1,988 millions at 1934 prices. In this case, comparing Indian farm prices with British retail prices, the rupee has a purchasing power as high as 4·63 to the £ sterling, as against its exchange rate of 13·4 to the £. It is of course not permissible to re-value the remaining 47 per cent of the Indian national income on the basis of so high a purchasing power for the rupee. Rs. 1,356 millions of the national income are spent on imports, while a further Rs. 2,595 millions represents the net output of large-scale factory industry. In these two fields output is being sold in competition with the produce of other countries, and we may value the rupee on the basis of its external value. There remains a residue of Rs. 4,138 millions, representing the production of handicrafts and services. We must exclude from this figure the transport and distribution of food to the urban populations, as all food consumption has already been re-valued on the basis of British retail prices. It appears reasonable to assume that one-tenth of all the food consumption is distributed at a cost amounting to twice its farm value (i.e. retail prices = three times farm prices). The transport and distribution of food for the urban population, therefore, represents Rs. 1,842 millions, leaving a balance of Rs. 2,296 millions.

No valid information is available for the re-valuation of handicraft production, but in the sphere of personal services directly

rendered the purchasing power of the rupees is exceedingly high. The average income of primary school teachers, for instance, is only Rs. 240 per year. Taking the corresponding figure for England at £150, and even assuming that the efficiency of the Indian teacher is considerably lower than the English, the purchasing power of the rupee in this sphere is about 2 to the £. Similar calculations for domestic services and for unskilled male labour give ratios of 3 and 4 rupees to the £ respectively. Dr. Rao conducted a census of washermen in Madras, whose average charges he found to be $\frac{1}{25}$th of a rupee per garment washed. Taking the corresponding figure for England at 3d. (which is, as far as can be judged, considerably below the average charge by an English laundry for a garment the size of an Indian loin cloth) we can obtain a purchasing power of the rupee of about 3 per £ sterling.

Indian National Income Re-valued at Sterling Price of 1925 to 1934

	Rs millions	£ millions.
Food consumption	9,211	2,360*
Imports and industrial production .	4,315	322
Transport and distribution of food .	1,842	Already incl.
Other services and handicrafts (basis of conversion 3·5 Rs. to the £) . .	2,296	656
Total . .	17,664	3,338

* Has been raised in the ratio 122 . 145 to raise 1934 prices to the average for the decade.

Converting sterling into I.U. on the same basis as previously, this becomes 17,420 millions I.U. or an average income per occupied person of 198 I.U.

Real Income of China

The first source of information is a calculation made in *Japanese Trade and Industry*, p. 623, estimating the average income of the Manchurian population at 52·5 yen per head for the year 1930. Average income per head in Japan in that year was 162 yen, according to Hijkata's estimate, or 165 according to the alternative estimate of Shiomi. Real income in Japan in 1930 is shown below (p. 114) to be 343 I.U. per head of occupied population, and in proportion therefore the corresponding figure in China would be 112 international units. It is possible that average income per head in Manchuria was lower than that of the rest of China.

Professor Tawney in *Land and Labour in China* estimates the

population in 1930 at 450 millions, of whom 360 millions were in farm families, and the remaining 90 millions were non-agriculturists and their dependants. Expressed in sterling retail prices of the period 1925–34, the average real income of a Chinese farm family, calculated from Professor Buck's data,[1] was £63 for a family of 6·66 persons. The sterling equivalent of the whole income of the farm population can therefore be put at £3400 m.

Professor Buck showed that for each hundred of farm population there were 35 "adult male equivalents" of working population. On this basis the 90 million non-agricultural population would include 31·3 millions of adult male equivalents. A census of large-scale industry was taken in 1930 (quoted by Tawney) showing that 1·3 million adult male equivalents were employed in factories with a gross output of $800 m. Chinese, with a net output of about half that amount. The other 30 million adult male equivalents in non-agricultural employment were presumably engaged in handicrafts, transport, etc., and their average wage may be estimated at 108 Chinese dollars per year, or a total of 5400 million Chinese dollars.

We thus have a total of non-agricultural incomes of approximately 5800 million Chinese dollars. To convert these into sterling values we must first reduce them to prices of the period 1921–25

[1] Summarising the results given in *Chinese Farm Economy*, Prof. Buck shows that the average value of net production per farm was 254 Chinese dollars per year in North China and 424 in Central China, during the period 1921–25. The average value of food consumed by the family was 140 dollars, which may be re-valued at sterling retail prices (of 1935) as follows:

	Kilos. consumed per Year	Value in Pence
Wheat	498	2188
Rice	391	1918
Other grain	655	2306
Beans and peas	50	255
Oils	11·6	320
Meat and fish	17·3	436
Poultry	2·3	71
Eggs	5·0	117
Fruit	4·1	50
		7661

giving £32·0 at 1935 prices of £34·8 at 1925–35 prices.

The real value of farm incomes, in terms of sterling prices, can be summarised thus:

	£ per Family per year North China	£ per Family per year Central China
Food	31	39
Rent	2	4
Other consumptional savings	22	28
Total	55	71

(giving 4800 million Chinese dollars), for which date we have Professor Buck's price data which can be compared with present-day sterling values. This figure at present-day sterling values becomes £915 m. and the total of agricultural and non-agricultural incomes becomes £4345 m. at sterling prices, or 22·7 milliard international units. Assuming that 200 millions of the 450 millions of population are "occupied" in a comparable sense to the statistics of other countries, this gives us once again a figure of 114 international units per head of the occupied population.

The Mitsubishi Bureau, quoted above, estimates that 77 per cent of the national income of Manchuria was derived from agriculture. The alternative estimate gives 79 per cent for the whole of China. The close agreement between these two estimates from entirely different sources may be considered satisfactory.

For remaining countries for which no statistics of national income are available it is found that estimates can be made on the basis of statistics of the rate of money wages.

For comparatively primitive countries where there is little skilled labour or differentiation between workers, wage rates are often quoted as a single figure of average daily wage. For the somewhat more advanced countries it is generally possible to obtain approximate figures of the wages of agricultural workers and skilled labourers, and skilled or semi-skilled workers.

In order to make estimates of national income from wage statistics, it is necessary to make a comparison between wage rates and average money income per occupied person in countries for which national income statistics are available. In these countries the only comprehensive comparative statistics are those prepared by the International Labour Office, giving the average hourly earnings of a selection of comparatively skilled occupations. In the table opposite, average hourly earnings in these occupations in January 1930 are compared with the average money income per occupied person of the whole community, for the period 1925–34.[1] They are converted to weekly figures on the basis of the average hours prevailing in each country. The International Labour Office gives figures for normal hours and principal occupations at this date, from which a general average can be estimated.

When these data are plotted, some interesting results are obtained. The straight line drawn across the diagram corresponds to the situation in which wages in these skilled occupations are

[1] The figures are those quoted by Professor Richardson in the *Journal of the Royal Statistical Society*, 1930, p. 406.

exactly equal to average wage income per occupied person. In Canada and U.S.A. wages are far higher than is indicated by this relationship. The explanation for this is that a substantial proportion of the occupied population in these countries consists of agriculturists, with very low incomes as compared with those of the urban wage earner. To a lesser extent the same discrepancy is noticed in Sweden, Denmark and Czechoslovakia. In Britain and Switzerland, on the other hand, the skilled wage-earner receives a comparatively low share of the national income. In these countries there is no large impoverished rural population.

COMPARISON OF WAGE RATES WITH AVERAGE MONEY INCOMES

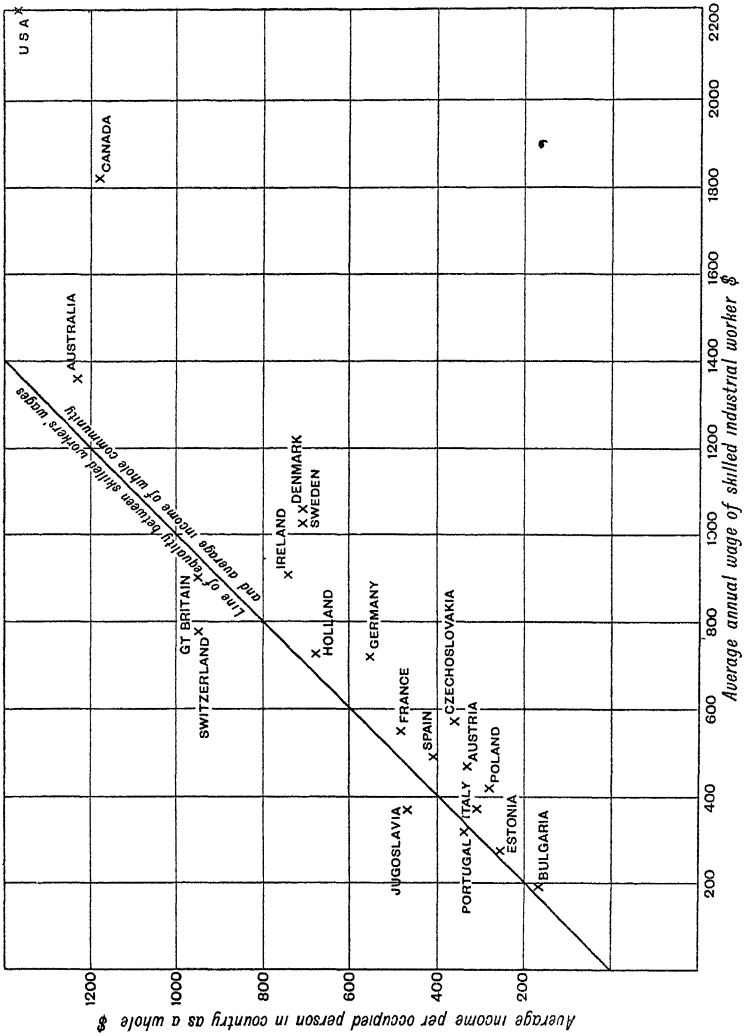
	Wages (cents per hour), January 1930	Wages ($ per week), January 1930	Average Money Income of Whole Country ($ per year) 1925–34
U.S.A.	89	42·2	1368
Canada	70	35·0	1180
Australia	59	26·0	1230
Denmark	42	20·2	708
Sweden	41	19·7	707
Great Britain	36	17·3	949
Irish Free State	36	17·3	741
Germany	30	13·8	556
Switzerland	30	15·0	950
Holland	29	13·9	680
Czechoslovakia	22	11·0	360
France	19	10·5	482
Austria	18	9·0	329
Italy	17	7·1	307
Spain	17	9·4	407
Poland	18	8·0	281
Bulgaria	*	3·7	172
Yugoslavia	13	7·1	470
Estonia	11	5·2	255
Portugal	11	6·1	342

* Average wage rates per day in 1928 (*International Labour Review*, 1930, vol. 2, p 225) are 61 leva for males, and may be estimated at about 85 leva for corresponding grades of skill See also *German Statistical Year Book*, International Section

The averages for Portugal and Yugoslavia are not quoted by Professor Richardson, but may be calculated from the tables of international wage comparisons, published by the *International Labour Review* in October 1929 and October 1930 respectively.

As we go down the scale of income, however, the points tend to cluster nearer and nearer to the straight line. It is axiomatic that as the national income of a country approaches zero, the rate of wages should similarly approach zero, and this enables us to state

with some confidence that countries in which the recorded wages of industrial workers are below $5 per week, will have a money income of less than $200 a year per head of the occupied population.



The following are the countries for which wage comparisons can be made. The source of information is, in nearly every case, the *International Labour Review.*

PHILIPPINES.—*International Labour Review*, 1928, Part I. Average wages per day in 1926 given as 1·9 pesos, corresponding to $5·7 per week.

CHINA.—*International Labour Review*, vol. xxiii, p. 583, gives wages in different industrial centres in 1929–30, together with average number of hours per day, and days per year. The average week comes out at 84 hours. Wages of classes of workers (foremen, skilled, unskilled, etc.) are given in the *International Labour Review* for July 1923, by Tayler and Zung, and in the *International Labour Review*, 1925, vol. 2, p. 668. Converting on the basis of one Chinese dollar equals 53 American cents, we obtain the following figures of average weekly wages in American dollars: As a basis of comparison we may take the wages of skilled men at $2·5 American per week.

	Chinese $ per month	American $ per week
Skilled engineers (Newchwang)	35	4·2
Foremen (Shanghai and Central China)	20	2·4
Skilled men (Shanghai, Canton, Ningpo)	12	1·4
Machinists and factory labourers	12·5	1·5
Skilled women workers	7	0·8
Unskilled women workers	4	0·5
Children	5	0·6
Rural labourers	5	0·6

MEXICO.—*International Labour Review*, 1930, Part II, p. 74, gives the estimated costs of subsistence of a worker's family (man, wife and two children) in the state of San Luis Potosi. The minimum cost of subsistence for an urban worker was 1·66 pesos per day, and it was stated that minimum wages in the towns had now been fixed at this level. An industrial census taken in 1935 (quoted in *Statesman's Year Book*) shows average earnings per day of all wages and salary-earners engaged in industry as 2·1 pesos. The average is not likely to be more than 2 pesos per day, or $1 American at parity of exchange, say $6 per week.

BRAZIL.—*International Labour Review*, 1930, Part II, p. 649, gives wage rates for ordinary agricultural labourers, labourers working on coffee, rice and sugar plantations, blacksmiths, carpenters and masons. The exchange value of the Brazilian milreis showed considerable fluctuations, rising from 11·2 cents in 1924 to 14·5 cents in 1926, falling again to 12 cents in 1928. Wages of blacksmiths, carpenters and masons averaged 6·2 dollars per week in

1924, and 7·4 in 1928. Rural wages were much lower, but also showed an upward tendency.

SYRIA.—*International Labour Review*, vol. 29, p. 409. The figures quoted show a wide range from \$1 a week for unskilled workers, to \$4·1 a week for foremen and carpenters. The average skilled town worker is given, very roughly, at 8 to 12 francs per day, i.e. \$2·5 per week.

BELGIAN CONGO AND RHODESIA.—*International Labour Review*, vol. 29, p. 687, and vol. 33, p. 722. Figures are quoted of wages in the mines in Belgian Congo and Tanganyika, and in Northern Rhodesia (based on report by E. A. G. Robinson). Wages are paid partly in cash and partly in kind, a valuation being put on the latter of 1s. 4d. in Rhodesia and 15 francs in Belgian Congo, respectively per day. The average cash wage is just over 1s. per day in the mines, which is nearly twice the cash wage paid by the railways, and three times the wage paid by farmers. The cash wage in the mines in Tanganyika is only 6s. to 9s. per month, together with remuneration in kind, the valuation of which is presumably similar to that recorded in Rhodesia and Belgian Congo. Wages in the mines in Belgian Congo and Rhodesia average \$4·3 a week, and the railways in Rhodesia \$2·7 a week, in Tanganyika \$2·3 a week; in each case inclusive of remuneration in kind.

BRITISH EAST AFRICA.—*International Labour Review*, vol. 33, p. 84. Average wages of an urban worker are given at 17s. to 18s. per month, sometimes with free accommodation. Equivalent wages, \$1·1 per week.

MALAYA.—*International Labour Review*, vol. 34, p. 793. Average wage for men is given as 11·2d. per day of 8 hours, or \$1·4 per week. Average women's wage is 9d. per day.

GOLD COAST AND FRENCH WEST AFRICA.—*International Labour Review*, vol. 34, p. 508. Cash wages in French West Africa were 5·3 francs per day in 1929, to which must be added remuneration in kind of 1·9 francs per day. It was reported that migrants to Senegal or the Gold Coast could obtain wages up to 12 francs per day, which corresponds to records from the Gold Coast showing wages paid to migrant workers of between 1s. 6d. and 2s. 6d. per day, equivalent to \$3 per week.

MARTINIQUE.—*International Labour Review*, vol. 32, p. 797. Skilled industrial workers earned from 20 to 40 francs per day, corresponding to \$7 per week. Wages recorded for unskilled industrial workers were much lower, viz. 11 to 15 francs per day, or \$3 a week. A 48-hour week was reported to be worked. An average wage of \$5 per week may be estimated.

ALGERIA AND MOROCCO.—*International Labour Review*, vol. 32, p. 397. Wages in Algiers were reported to range from 12 to 20 francs per day (i e. an average of about $3·7 per week). In Spanish Morocco they were 3 to 5 pesetas per day, or about $2·8 per week

CEYLON.—Wages of agricultural workers given in official statistics at about 4 rupees per week, or $1·5.

URUGUAY.—*Anuario Estadistico* gives the wages of all claimants for accident benefit in the year 1933. It may be assumed that these are representative of the wages of industrial workers. The average worked out at 2·18 pesos per day. At par of exchange the peso was worth the same as the American dollar, and an average may be put at $12 per week.

PALESTINE.—*International Labour Review*, 1931, vol. 2, gives a table showing the wage distribution of Jewish town and country workers, and also a number of wage rates for Jewish and Arab workers in different occupations. The general average for fairly skilled occupations is in the neighbourhood of $9 per week.

TURKEY.—The average wages for the mining, building, chemical and metal industries are quoted in the *German Statistical Year Book*, International Section, as £T278 per annum, or $132 per annum, in 1933.

On the basis of the diagram shown above, it is possible to make approximate estimates of the order or magnitude of money income per head in these countries. It is clear, however, that money incomes do not provide a satisfactory basis of international comparison. The purchasing power of money may be expected in these countries to be considerably higher than in the rest of the world. From the figures shown above, the general price level in the countries for which information is available, converting currencies at 1929 parities, was as follows:

AVERAGE FOR PERIOD 1925–34, INTERNATIONAL COMPARISONS OF GENERAL PRICE LEVEL (U.S.A. = 100)

Australia	126	Great Britain	93	Czechoslovakia	75
Norway	120	Switzerland	93	Japan	75
South Africa	119	Canada	88	France	70
Sweden	108	Hungary	86	Belgium	70
Denmark	104	Germany	86	Austria	64
U.S.A.	100	Holland	79	Spain	62
Italy	97	Turkey	79	Greece	53
Ireland	96	Latvia	78	Poland	52
Finland	94	Estonia	75		

The purchasing power of money was highest in Poland and

Greece, but these countries have recently been through violent currency fluctuations The same applied to a lesser extent to France and Belgium. The two countries with the lowest money income included in the table were Turkey and Japan, in which countries the index stood at 79 and 75 respectively.

We shall probably be able to get results within the range of 10-20 per cent of actuality if we estimate that the purchasing power

	Wages, $ per week	National Income, $ per head per year	
		Money Income	Do, allowing for Purchasing Power of Money
Philippines	5·7	250	375
Mexico	6	240	360
Brazil	7·4	290	435
Syria	2·5	100	200*
Belgian Congo and Rhodesia (mining wages)	4·3	175	260
Rhodesia (railway wages)	2·7	105	160
Tanganyika	2·3	95	140
East Africa	1·1	50	75
Malaya	1·4	60	90
French W. Africa	1·7	65	130*
Gold Coast	2·9	120	180
Martinique	5	200	350*
Algiers	3·7	150	300*
Spanish Morocco	2·8	110	220*
Uruguay	12	490	650
Palestine	9	360	360
Turkey	2·5	100	130
Ceylon	1·5	65	100

* In calculating real income additional allowance has been made for the undervaluation of the franc and peseta.

of money in the less economically developed parts of the world, for which records are lacking, is given by a price index in the neighbourhood of 66 (U.S.A. = 100), making the additional allowance, however, for the fact that the French franc and the Spanish peseta were at that time admittedly undervalued in comparison with the world's other currencies.

From these data we may make estimates of the money and real incomes per head on a basis in some degree comparable with those

of the larger countries, for a number of the less economically developed parts of the world. It is probably the case that they are correct within 50 units, and can be used approximately to classify those countries according to average income per head.

From these data taken together we get, subject to varying degrees of approximation, figures indicative of economic development and of average real income per head expressed in international units for nearly every part of the world over the decade 1925–34. Few would have expected so wide a range, namely a fourteen-fold difference between average standards of living in the U.S.A. and Canada which at that date headed the list, and those prevailing in the poorest parts of the world. Extreme poverty, as indicated by a figure of real income per head of the occupied population of less than 200 international units, was shown not in isolated areas, but over very large tracts of the earth's inhabited surface.

In the table below (see pages 54 and 55) an approximate analysis into income groupings is made, subject to certain assumptions, for every country of the world. Against each country is given the figure of its population at the end of 1935 as recorded or estimated by the League of Nations.

More than half of the world's population must immediately be placed in the poorest category of all, with a real income insufficient to provide a subsistence. The low figure for the income category 200-300 is largely due to lack of knowledge, and it is possible that considerable numbers who have been placed in the adjacent categories should be placed here. But there is a great concentration of the world's population in the category 300-400 units, including Japan, Soviet Russia, Italy, Poland and a large part of Central and South America. Above this point the distribution is irregular. There is a considerable concentration in the range 600-700, which includes both France and Germany, but the wide range between 700 and 1000 units only includes eighteen millions of population and three countries, namely Holland, Australia and the Irish Free State.

	Europe	America	Asia	Africa	Oceania
1300-1400	.	U.S.A.[1] 128 04 Canada 10 98			
1200-1300	..	..		.	New Zealand 1 57
1000-1100	Great Britain[2] 47 14 Switzerland[3] 4 17	Argentine 12 37			
900-1000	.	.		.	Australia 6 75
800-900	Holland 8 47				
700-800	Irish Free State 2 97				
600-700	France[7] 41 92 Denmark[4] 3·73 Sweden 6 25 Germany[5] 67 51 Belgium[6] 67 60	Uruguay 2 04			
500-600	Norway[8] 2 88 Austria 6 76 Spain[9] 24 87	Chile 4·51			
400-500	Czecho-slovakia 15 16 Yugoslavia 14 95 Iceland 0 12	Brazil 41 56			
300-400	Greece 6 84 Finland 3 58 Hungary 8 94 Poland 33 82 Latvia 1·96 Italy[13] 42 57 Estonia 1 13 U.S.S.R. 173 00 Portugal[14] 7 22	Rest of America[10] 63 75 .	Japan[11] 69 83 Palestine[12] 1 60 Philippines 13 26	Algeria 7 21 Egypt 15 47	Hawaii and Guam 0 41
200-300	Bulgaria 6 17 Roumania 19 20 Lithuania 2 50 Albania 1 09	. ..	Turkey 16 25 Syria 3 30 Cyprus 0 36	South Africa 9 50 Morocco[15] 7 23 Tunis 2 60	
Under 200	..	.	China[16] 450 0 British India[17] 370 5 Dutch Indies 65 42 Rest of Asia[18] 117 8	Rest of Africa[19] 106 09	Rest of Oceania 1 66

[1] Including Alaska.
[2] Including Isle of Man, Channel Islands and Northern Ireland.
[3] Including Liechtenstein.
[4] Including Faroe Islands.
[5] Including Danzig.
[6] Including Luxemburg.
[7] Including Monaco
[8] Including Svalbard.
[9] Including Andorra and Gibraltar, Canaries
[10] Newfoundland with St Pierre and Labrador (0 30), Mexico (18 77), Costa Rica (0 58), Cuba (4 29), Dominica (1 49), Guatemala (2 37), Haiti (2·60), Honduras (0 98), Nicaragua (0 85), Panama (0 52), Salvador (1 60), British West Indies (2 25), American West Indies (1 79), French West Indies (0 51), Dutch West Indies (0·08), Bolivia (3 00), Colombia (8 58), Ecuador (2 00), Paraguay (0 90), Peru (6 90), Venezuela (3 36), Falkland Islands (0 003), British, French and Dutch Guianas (0 55), Greenland (0 002).
[11] Including Sakhalin but not Corea or Formosa.
[12] Including Transjordan
[13] Including Malta, San Marino and Vatican.
[14] Including Azores.
[15] French and Spanish Morocco, Tangier, Spanish North Africa.
[16] Including Manchuria, Outer Mongolia and Tibet.
[17] Including Native States.
[18] Afghanistan (7 00), Arabia and Bahrein (7 12), Bhutan (0 25), Irak (3 60), Iran (15 00), Nepal (5 60), Siam (13 24), Ceylon (5·70), Malaya (4 61), other British colonies (2 03), Indo-China (22·90), other French colonies (0 55), Aegean Isles (0 13), Korea (22 99), Formosa and Pescadores (5 31), Kwantung (1 70), Portuguese colonies (1 27)
[19] Liberia (2 50), British West Africa (24 49), Kenya and Uganda (6 76), Northern and Southern Rhodesia (2 67), Sudan (5 90), other British colonies and mandates (10 19), Belgian Congo and Ruanda-Urundi (12 90), French colonies and mandates (25 28), Italian colonies (7 86), Portuguese colonies (7 50).

EUROPE.—Figures have been obtained above for all countries except Iceland and Albania. It is assumed that the standard of living in Iceland is somewhat below that of Norway. For Albania estimates are available of the aggregate value of agricultural products indicating a very low standard of living.

AMERICA.—Apart from the U.S.A. and Canada, data are very unsatisfactory throughout. Vague indications show that the Argentine, Uruguay, Chile and Brazil (in that order) enjoy fairly high incomes. For the whole of the rest of America we have wage indications relating to Mexico and Martinique only. In both these cases average income per head appears to be over 300 units, and on the strength of these indications the remaining 64 millions of population in the American continent is placed in this class.

ASIA.—Japan is the only country for which full income statistics are available. There are fairly good indications of a comparatively high standard of income in Palestine and the Philippines, and of a rather lower standard of income in Turkey and Syria. Apart from the inclusion of Cyprus in this class, the remainder of Asia must all be included in the lowest-income class. There is no doubt whatever about the extreme poverty of China, British India and the Dutch East Indies. The position of some of the other Asiatic countries such as Irak and Iran is more doubtful.

AFRICA.—Approximate computations of national incomes have been made for South Africa and Egypt, and indications can be obtained from wage rates prevailing in Algeria and Morocco. Tunis is included with the latter, but the remainder of the African continent must be included in the lowest-income class.

OCEANIA.—Apart from Australia and New Zealand, this continent only contains two millions of population. Incomes in Hawaii are assumed to be similar to those of the Philippines, while the remainder of the continent (including New Guinea) is included in the poorest category.

The following alternative classification is of some interest:

WORLD INCOME, 1925–34

		Milliards of I U.
The four Great Powers:		
U.S.A.	65·6	
Great Britain	21·9	119·0
Germany and Austria	19·0	
France	12·5	
Other creditor countries:		
Canada, Holland, Switzerland, Ireland		10·5
Wealthy debtor countries:		
Australia, New Zealand, Argentine, Uruguay, Chile, Brazil		13·8
Other industrial European countries:		
Sweden, Denmark, Norway, Iceland, Belgium, Spain, Czechoslovakia		13·3
Poorer European countries:		
Yugoslavia, Greece, Finland, Hungary, Poland, Latvia, Italy, Estonia, Portugal, Roumania, Lithuania, Albania		16·6
U.S.S.R.		17·5
Japan		8·1
Other partially developed countries:		
Egypt, Algeria, Tunis, Morocco, South Africa, Turkey, Palestine, Syria, Cyprus, Philippines, Hawaii, rest of Central and South America		7·3
China		22·7
British India		15·0
Dutch Indies		2·6
Rest of Asia, Africa and Oceania		8·0
WORLD TOTAL		254·4

It may be added as a matter of interest that considerable changes have already taken place from the 1925–34 figures given above in the size and order of real incomes per head. The U.S.A. and Canada have both been overtaken by New Zealand, which now occupies the highest position on the list, and there have been considerable advances in Great Britain, Australia, Sweden and Denmark, while the French and Swiss figures have fallen heavily. There has also been a considerable advance in Japanese figures, and an advance of about 10 per cent above the 1934 level of the Russian figures. These changes will be discussed in detail later.

The following table gives the distribution of the entire world's population according to income categories :

Income per Head, I.U.	Millions of Population
Over 1250	139
1000-1250	65
700-1000	18
600- 700	130
500- 600	39
400- 500	72
300- 400	451
200- 300	68
Under 200	1113
	2095

Most unexpected is the extent to which the four great industrial countries predominate in the world's economics. They enjoy not far short of half of the world's entire income of goods and services, though only containing 300 millions of population ; in conjunction with the four smaller creditor countries, they enjoy more than half of the world's entire income. This is a fact of great importance when we come to examine the economic equilibria which are set up between the creditor and debtor countries of the world. With so large a proportion of the world's income in the hands of the creditor

countries it is clear that great attention must be paid to causes within those countries as factors determining the world economic situation. Next are enumerated what can only be called the "wealthy debtor" countries, namely those which, though debtors, enjoy a high standard of real income; namely Australia and New Zealand and certain of the South American countries. Enjoying about a similar aggregate of income come another group of industrialised or comparatively industrialised European countries, with incomes between 700 and 500 units. These countries are not creditors or debtors to any considerable extent. The remainder of Europe enjoys incomes of below 400 units per head, but has a large population and a considerable aggregate income. The largest countries in this category are Italy and Poland.

The U.S.S.R. and Japan are both unique and each has a substantial fraction of the world's income. In China and British India, though average real incomes per head are very low, the populations are so great that the aggregate incomes are substantial.

CHAPTER III

THE UNUSED POTENTIALITIES OF PRODUCTION

IN the last chapter we have surveyed the available information about real national incomes, that is to say the quantity of goods and services actually produced in different parts of the world. It is widely believed, however, that the amount actually produced now falls far short of potential productive capacity. The existence of widespread unemployment in the modern world might be taken as an indication that the amount of goods and services actually produced fall somewhere short of the full productive capacity of modern communities. This is not necessarily the case. In Great Britain in 1937 for instance, when the proportion of unemployed among the insured population was 10 per cent, a number of industries found it impossible to expand their output further owing to shortage of skilled labour. A very large proportion of the unemployed in this case (and indeed the same would be found in other countries) were unskilled. So far as unemployment is due to such occupational maldistribution of the population, its existence cannot be taken as proving that the community is producing less than what might reasonably be called, so far as the immediate future is concerned, its full potential production.

The same argument also applies to geographical maldistributions when they occur. In Great Britain, at any rate in recent years, these have been of considerable importance.

On the other hand it is also possible, under certain circumstances, to find the proportion of unused productive capacity considerably in excess of the proportion of unemployment, as is indicated by the example shown below.

The only full and scientific surveys of the amount of unused productive capacity in any modern community are those relating to the period 1925–29 made in the U.S.A. by the Brookings Institution under the title *America's Capacity to Produce* and a similar investigation in Germany based on this example. The authors' own conception of a sub-title to *America's Capacity to Produce,* in which full allowance should be made for all the qualifications of their arguments, was one which read as follows: "America's Capacity to Produce during the Period 1925–29 with the Capital Goods and Labour Force which she then possessed, and with the Technology and the General Body of Operative and Commercial Organisation then prevailing". The authors endeavoured to determine the true practical productive capacity of all manufacturing and mining plant, making full allowance for necessary reserves of plant for breakdowns and seasonal peaks; and subject also to the qualifications specified in the above sub-title.

Definite and satisfactory measurements of productive capacity utilisation have been made covering the mining industries and manufacturing. These both showed 83 per cent of utilisation of practical capacity for the year 1929, and just over 80 per cent for the period 1925–29 (83 per cent in mining and 80 per cent in manufacture).

Investigations were also made of the extent of utilisation in transport and commerce. It appears that the transport facilities of the U.S.A. in that year were only used to about 70 per cent of their practical capacity, and that transport considerations would have provided no obstacle in the way of a considerably increased output of goods. So far as wholesale and retail trading was concerned, the authors believed that a considerably increased quantity of goods could be handled if the public were willing to make certain alterations in the seasonality of their buying habits and not to concentrate retail demand so heavily on the two seasons of Christmas and Easter. The absorption of the unemployed at that date, together with the release of a considerable amount of

under-employed labour from agriculture, commerce and construction, would have been sufficient to provide the labour force needed to work all the manufacturing and mining establishments of the U.S.A. up to their full practical productive capacity.

The object of this investigation was to measure the amount of productive capacity which was in existence and utilised. The authors point out that there were striking differences in the amount by which production might have been expanded in separate branches of industry. For example the production of gunpowder in 1929 could have been increased 96 per cent while that of electrolytic copper could have been increased only about 3 per cent. If, therefore, an attempt was made immediately to run each industry at its existing full capacity, large quantities of certain types of goods would be produced for which no present use could be found. Coal mines and coke plants would turn out more metallurgical fuel than blast furnaces and steel mills could utilise even when operating at full capacity, there would be more crude oil than the refineries could treat, and far more explosives than all the mines and quarries of the country could use even on the new full capacity schedule. Output of flour would be almost double that which the country would be likely to consume.

Apart from extreme cases such as gunpowder, however, a wide range of industries show a percentage of unutilised capacity within the range 10 to 30 per cent. Here it is more reasonable to assume that, subject to certain economic readjustments, the general stepping-up of activity could have been obtained.

The authors also make their problem distinctly harder by omitting all possibility of export and import trade. If the U.S.A. could hope to find markets abroad even for part of the produce of her present unused capacity in such industries as flour-milling and gunpowder, the problem would be rendered easier. Furthermore they make no allowance for possible changes of demand consequent upon changes in price. Even though many

articles such as flour have to meet an almost completely inelastic demand it is probably the case that in certain other articles a reduction of prices might lead to considerably increased demand.

In manufacturing production the weighted average percentage utilisation of practical capacity in 1925–29

PERCENTAGE OF PRACTICAL CAPACITY UTILISATION, 1925–29

Minerals		*Manufacture*	
Bituminous coal	77	Meat-packing	86
Anthracite coal	81	Dairy products	95
Beehive coke	46	Fruit and vegetable canning	80
By-product coke	91	Beet sugar	70
Crude petroleum	91	Flour-milling	50
Petroleum refining	87	Cotton manufacture	80
Natural gasoline	61	Wool manufacture	70
Blast furnaces	85	Silk and rayon manufacture	85
Copper mining	77	Full fashioned hosiery	97
Electrolytic copper refining	85	Men's clothing	78
Lead-smelting	77	Boot and shoe	80
Lead-refining	81	Automobile	83
Zinc-smelting	68	Tyre	85
Electrolytic zinc-refining	88	Paper	92
Gypsum	81	Printing and publishing	90
Cement	92	Steel	93
Gunpowder	53	Rolled steel products	73
High explosives	80	Tinplate	68
		Wire	74
		Locomotive	40
		Textile machinery	55
		Machine tool	71
		Lumber	72
		Window glass	62
		Plate glass	85
		Chlorine and allied products	75

was 80 per cent. It is of interest to notice that the weighted average percentage for capital-goods-producing industries (iron, steel, locomotives, textile machinery, machine tools, lumber, window glass and plate glass) was 73 per cent.

The authors state that there is some evidence (though not very full) to show that the percentage of unutilised

capacity during recent years is no higher than it was at the beginning of the present century. It must be remembered that the years 1925–29 were the best years of a long upward swing of the trade cycle, and for comparisons with the past we must in fairness choose the culminating years of previous trade cycles. Periods corresponding to this criterion were 1897–99, 1906–7 and 1911–13. The industries for which information can be obtained over this period are not numerous, and only moderately representative. The following is the list of industries, with the unweighted average of percentage capacity utilisation, interpolated for deficiencies in the statistics :

	1929	1925–29	1911–13	1906–7	1897–99
Bituminous coal	83	77	84	85	82
Anthracite	80	81	87	81	60
Beehive coke	58	46	65	..	..
By-produce coke	95	91	87	..	.
Flour-milling	44	41	37	35	..
News-print	85	86	93*	..	78‡
Pig iron	93	85	80	92	..
Copper	97	85	85	75	..
Cotton-spinning	85	82	78	..	82§
Automobiles	85	83	90†	..	..
Unweighted average	80	76	79	78	69

* 1913. † Approximate, calculated from theoretical capacity ‡ 1899. § 1900.

So far as they can be interpreted, these figures support the contention that non-utilisation of capacity, at any rate so far as the United States is concerned, goes back as far as the 1890's, on very much the same scale as now prevails. In that country at any rate it is certainly no new problem.

An investigation was also made in Germany by the Institute of Conjuncture estimating the extent to which productive capacity in Germany was utilised in the year 1934. The first result[1] showed a percentage utilisation of productive capacity in that year of 60 per cent only.

[1] Published in the *Weekly Report* 18th September 1935.

It was specifically stated that the methods used by Mr. Nourse and his associates in *America's Capacity to Produce* were also followed in the German investigation, with some revision of the technique for dealing with seasonal industries. An industry was considered seasonal if the production in the peak month was 20 per cent, or more above average production for the year. In industries such as jam-making which work only for a short season, capacity was estimated as the maximum monthly production multiplied by the length of the season in months. For industries carried on throughout the year, but with a strong seasonal variation, capacity was calculated as the arithmetic mean of the highest monthly production multiplied by 12, and of the highest annual production in the period 1927 to 1934. By the first half of the year 1935 percentage utilisation was estimated to have risen to 65, and by the middle of the year to somewhere between 66 and 69. The extent of non-utilisation was in this case much more uniform. The following gives the utilisation in percentages of practical capacity in the first half of the year 1935 :

Mining	60	Building and construction	56
Iron and steel	70	Wood-working industries	51
Non-ferrous metals	66	Chemicals	67
Engineering	77	Paper	75
Passenger automobiles	100	Leather	67
Motor trucks	97	Textiles	57-60
Motor cycles	53	Clothing	48
Electrical engineering	64	Foodstuffs	70
Optical and precision instruments	61	Electrical power	61
Finished iron and steel goods	61	Gas	67
		TOTAL	63·7

The report of the Institute continues, " The present industrial situation in Germany must be judged somewhat differently, however, from that of a country with a self regulating economic system. In many industries in Germany there are restrictions and prohibitions against over-investment." A list is then given of a large number of industries in which, on the grounds of unused

existing capacity, new investment had been forbidden at various dates between 1933 and 1935.

It is possible to follow the subsequent course of capacity utilisation through figures regularly published, showing the number of labour-hours worked in industry as a percentage of full labour-hours capacity.[1] Since 1936 the figures are not published in the form of percentages of capacity, but as an index based on the 1936 data. It is assumed that during the course of one year there has been no considerable change in aggregate capacity. No doubt "labour-hour capacity" represents a theoretical standard not actually attainable. For the year 1934, for example, in which year the percentage of practical capacity utilisation was given as 60 per cent, the number of hours worked was shown as 53·7 per cent only of capacity. Increasing the data in this ratio, we obtain the following estimated figures of the percentage of capacity utilisation in Germany for each year since 1928:

Second half 1928	77	1933	46
1929	75	1934	60
1930	63	1935	66
1931	50	1936	72
1932	40	November 1937	85

A small unofficial inquiry conducted by the University of Birmingham in 1936 showed that the percentage of practical capacity utilisation in a number of leading industries situated in the Midlands industrial area of England was about 80 per cent at that date. The range of variation was wide; the lowest figure, namely that of the pen-making industry, was below 50 per cent, while a number of important industries were then working at full practical capacity.

The general impression to be derived from these figures is that hitherto, in the *active period of the trade cycle* actual industrial production tends to approach, on the average of different industries, a level of about 80 per cent of maximum practical capacity. In view of

[1] Official figures published monthly in *Wirtschaft und Statistik* and by the Institute of Conjuncture.

the maladjustments between supply and requirements of different sorts of productive capacity, due to the durability of much productive equipment and the freedom which capital enjoys of entering different trades, it seems inevitable that a discrepancy somewhat of this nature should persist. Even in Germany, where the freedom of capital to enter different industries has been sacrificed, production remains considerably below full estimated practical capacity, though no doubt the discrepancy will be reduced as time goes on and the effects of economic planning become more marked — and also, it must be said, if Germany were in a position to enter more fully into both export and import trade, better utilisation could be obtained. Of the extent of non-utilisation in the bad years of the trade cycle, however, there is not the slightest doubt.

It is now apparent that the year 1937 was a turning-point in the trade cycle in most countries, though the subsequent depression was generally mild. It is of interest to compare the levels of industrial production reached in the most active months of 1937, as compared with the average of 1929, in the different countries.[1]

PERCENTAGE INCREASE IN INDUSTRIAL PRODUCTION, 1937 AS COMPARED WITH 1929 (1929=100)

Russia	240	Norway	132
Japan	174	Great Britain	126
Greece	165	Germany	123
Latvia	157	Austria	111
Finland	155	Italy	108
Estonia	154	Canada	104
Sweden	146	Holland	102
Chile	145	U.S.A.	102
Bulgaria	140	Czechoslovakia	100
Hungary	140	Belgium	91
Denmark	138	Poland	88
Roumania	134	France	75

[1] Figures from *League of Nations Monthly Bulletin of Statistics*, with the exception of those for U.S.S.R., where the increase in real quantity of all non-agricultural production between 1928 and 1937 is taken from *Critique of Russian Statistics*

Official Russian figures are based on a deliberately selected group of industries and give a spurious result.

Some remarkable tendencies are here brought to light. We are not concerned at the moment with the general question of the rapidity of economic progress, which will be dealt with in a later chapter. But it is clear that certain countries, including the U.S.A. and Canada, must have been producing at considerably lower percentage of capacity at the height of the 1937 boom than in the 1929 boom. This also applies to Belgium, Poland, Holland and Czechoslovakia, which were among the most important industrial countries of Europe in 1929. In Great Britain percentage utilisation of capacity in 1937 was probably, although one cannot say certainly, greater in 1937 than in 1929. In a number of other countries, particularly Russia, Japan, Chile (possibly other South American countries too), the Scandinavian countries, and Latvia and Estonia, industrial advance has been extremely rapid, and it is hard to believe that there is any substantial amount of unused productive capacity.

The above summarises all we know at present about the extent to which the world fails to make use of its physical resources for production. With regard to the non-utilisation of its human resources, commonly known as unemployment, rather more is known. We are on treacherous ground, however, if we take the existence of unemployment as a measure of the extent, or even as an indication of the existence of non-utilisation of productive capacity. In a highly mechanised industrial system like that of the U.S.A., 20 per cent non-utilisation of capacity such as prevailed in 1929 may be associated with (as was indeed then the case) only 5 per cent of unemployment among the working population. On the other hand if a substantial proportion of unemployment is accounted for by occupational and geographical maldistributions, the existence of unemployment is no indication of the existence of unused productive resources which can be put into utilisation within any short period of time. In Great Britain, for instance, for many recent years unemployment has been concentrated in certain

geographical areas in which for a number of reasons no economic development was taking place. Even more marked was the tremendous preponderance of unskilled and semi-skilled among the unemployed, while there was never more than a comparatively small surplus of labour in the skilled occupations. (This situation indeed is found to prevail in all countries for which we have information and is analysed in much more detail in Chapter VI below.) But while conditions like this prevail, any attempt to bring these unemployed human resources into utilisation by encouraging general economic activity is bound to fail unless at the same time special measures are taken to correct occupational and geographical maldistributions of the working population.

Subject to this exceedingly severe qualification, we may examine the unemployment figures prevailing in the principal countries of the world in the course of the last twenty years. Only in very few cases can unemployment figures be regarded as comprehensive, accurate or even continuous with themselves. The only valid source of information, even in countries with an apparently comprehensive scheme of unemployment insurance such as Great Britain, is in returns of unemployment actually collected in the course of the periodic census of population. This of course only gives us unemployment at a single date. If we have a continuous series of figures showing the absolute or relative numbers of unemployed at other dates, we can link these on to the Census data to obtain approximate ideas of the extent and movement of unemployment in other years. This is a subject on which anything approaching accurate information is unfortunately unobtainable.

In order to compare the extent of unemployment in different countries, the only valid basis for comparison is the number of unemployed as a percentage of the whole occupied population other than those engaged in agriculture. It is not implied that agriculturists are never unemployed; but unemployment among them

often takes the form of intermittent work, particularly where family farming is prevalent, and even in countries where information on agricultural unemployment is collected, the conventions for measuring it differ widely. We must therefore exclude all agricultural unemployment from our calculation, and all agriculturists from our statistics of occupied population. It is not sufficient to calculate unemployment as a percentage of the population insured against unemployment (e.g. in Great Britain or Germany) or of estimated figures of the wage-earning population; for these exclude a considerable number of salary-earners, public servants, independent traders and the like, who are on the whole much less subject to unemployment than other sections of the working population. Indeed, inclusion in an unemployment insurance scheme, or in the records of a trade union giving unemployment benefit, is often indicative of the fact that the workers concerned are subject to abnormally high risk of unemployment. The number of unemployed as a percentage of the whole occupied non-agricultural population (omitting employers and those who own their own businesses) is the only satisfactory base in interspatial or even intertemporal comparisons.[1]

In the following table calculations are made of the average rate of unemployment in a number of countries over the decade 1925–34, the figures for the best and the worst years within this period, and for the most recent twelve-monthly period available, terminating in each case somewhere between September and December 1937.

[1] The trader or manufacturer owning his own business is *ex hypothesi* not subject to unemployment. If as between two countries, one has a considerably larger proportion of such independent traders, it will appear that the percentage of unemployment, as calculated by the above method, will be lower in the former country. There is, however, a certain validity about the statement that the risk of unemployment in the former country is less than in the latter owing to the greater proportion of independent livelihoods.

UNEMPLOYMENT AS A PERCENTAGE OF NON-AGRICULTURAL OCCUPIED POPULATION

	Average of 1925–34	Best Year	Worst Year	1937
U.S.A.	14·7	4·5 (1929)	30·0 (1933)	21·4
Great Britain	12·6	8·2 (1927)	16·8 (1932)	10·4
Germany	18·8	2·4 (1925)	34·0 (1932)	11·9
France	About 4·0	1·6 (1926)		About 24·0
Canada	11·8	4·5 (1928)	22 3 (1933)	13·2
Australia	12·4	5·2 (1927)	21·7 (1932)	7·0
Sweden	8·6	5·9 (1929)	13·8 (1933)	6·8
Austria	14·3	9·0 (1925)	21·9 (1933)	17·3
Norway	12·6	7·2 (1925)	18·1 (1933)	10·3
Hungary	16·7	6·6 (1928)	18·3 (1932)	10·0
Czechoslovakia	6·1	0·9 (1928)	16·8 (1933)	9·3
Greece	About 11·0	6·5 (1928)	17·8 (1932)	
New Zealand	8·1	3·0 (1925)	12·5 (1932)	6·3
Italy	4·4	1·0 (1926)	8 8 (1932)	not published

We also have isolated data for the following countries :

	Date	Percentage
Argentine	1932	8·7
Portugal	1931	2·1
Spain	1936	8·0
Mexico	1931	10·5

U.S.A.—Measurement is remarkably difficult. A summary of currently available estimates was made by T. J. Kreps, *Journal of the American Statistical Society*, 1934, Supplement, p. 84. He showed that the estimates made by the American Federation of Labour and by Colonel Ayres were in close agreement and justified by other data. He collected quarterly figures from the beginning of 1930 to the end of 1933. Referred to below as "Kreps".

Another series of estimates from 1929 to 1935 were compiled by Nathan, *International Labour Review*, vol. 33, p. 49. These differ slightly from those previously quoted.

An official census of unemployment throughout the U.S.A. was taken in November 1937, and the results published in the press at that time. Including an estimate for unrecorded unemployment, the total amounted to 11·7 millions.

Figures of employment of the greatest comprehensiveness and validity are those calculated by Dr. Simon Kuznets in *National*

Income in the United States, 1929–35. It must be noted that he excludes relief workers and unpaid family labour on farms. Subject to these qualifications, they are found to fit closely to the other data.

The most ambiguous point relates to the growth in employable population since 1930, and on this point a special calculation is made below. The ratio of occupied to total population in certain of the younger age groups was rapidly falling between 1920 and 1930, and it was assumed that the fall continued, giving the following percentages of occupied to total population at various ages, assumed to be valid for 1935–40:

Age	Male	Female
14	5	2
15	8	4
16	23	10
17	40	25
18-19	65	38
20-24	89·5	44
25-29	97·0	31
30-34	97·6	24
35-39	97·7	23
40-44	97·6	22
45-49	97·2	21
50-54	95·7	20
55-59	93·0	17
60-64	86·8	15
65-69	75·7	11
70-74	57-5	8
75 and over	32·3	4

Numbers in each age group for 1935 and 1940 were computed by the 1930 age-distribution and from current mortality rates, assuming absence of immigration.

The whole occupied population of the U.S.A. was calculated at:

	(Numbers in Millions)		
	1930	1935	1940
Males	38·08	39·55	42·08
Females	10·75	11·06	11·85
TOTAL	48·83	50·61	53·93

The growth in employable population between 1929 and 1930 is calculated from data published by Dr. King for the National Industrial Conference Board. For 1930–33 Kreps's figures are used, and from that date onwards interpolated figures based on the calculation given above.

Kuznetz's most recent figures for the numbers of persons engaged relate to 1935 (*loc. cit.* p. 33). These figures are carried forward to 1937 by use of the published index figures of employment in the principal branches of economic activity, together with certain other estimates. Omitting agriculture and miscellaneous, the following estimates are made :

	(Numbers in Thousands)	
	1935	1937
Mining . . .	730	730
Electricity and Gas .	282	320
Manufacture . .	8151	9550
Construction . .	761	1250
Transport . .	2417	2450
Communication .	361	400
Trade . . .	5466	6010
Finance . . .	962	1000
Government (excluding relief) .	3495	3700
Service . . .	5922	6430
Miscellaneous .	2070	..

Omitting agriculture from the figures which would be necessary in any case owing to difficulties of definition, we obtain the following results. Kreps's figures are very closely confirmed by the other calculation. The number of persons engaged in agriculture included in the employable population on a definition similar to that of the Census, is given by Nathan.

The discrepancy between the 9·3 millions calculated below, and the 11·7 millions recorded for November 1937, can be explained partly by the fact that unemployment was very much worse in November than for the average of that year, probably by a million or more ; and by the inclusion of agricultural unemployment. This latter, if fully measured, must be considerable. Thus in 1930 the Census reported 6,012,000 farmers, 2,733,000 farm wage-workers and 1,660,000 unpaid family workers in farming in the U S.A. Dr. Kuznetz's estimate for equivalent full-time employment during that year was 5,524,000 farmers and 1,893,000 wage-workers only.

Year	(Numbers in Millions)				
	Employable Population	Employable Population, excluding Agriculture	Persons Engaged, excluding Agriculture (Kuznetz and Employment Index)	Non-agricultural Unemployment	Non-agricultural Unemployment, Kreps's Calculation
1929	48·3	37·71	36 39	1·32	..
1930	48·93	38·45	34·39	4 06	4·13
1931	49·34	38·96	31·06	7 90	7·72
1932	49·68	39 16	27·62	11·54	11·60
1933	50·06	39·46	27·68	11·78	11·81
1934	50 33	39 88	29 83	10·05	..
1935	50 61	40·06	30 62	9 44	..
1937	53·93	43·38	34·1	9·28	

The American Federation of Labour estimated between 11 and 12 millions unemployed throughout 1935–37; this estimate also presumably includes some agricultural workers.

Dr. King's estimate for the increase in occupied population between 1929 and 1930 is probably too high. Calculating backwards on Kreps's basis, we find an occupied population excluding agriculturists of 37·91 millions, giving a total unemployment of 1·52 millions. This estimate of 4 per cent of the occupied population is considerably lower than that calculated by Mills and others in *Recent Economic Tendencies* (1930), and is raised to 4·5. Varying data are available for the years 1925–28, including those calculated above, and (for 1925 and 1926) those calculated by Professor Douglas in *Real Wages in the United States.* A general average of 7 per cent is assumed for the four years 1925–28.

An independent estimate of the extent of unemployment in U.S.A. in 1929 is made in *America's Capacity to Produce* in the course of the authors' survey of the adequacy of labour resources for increased production. The data are scattered through the book and are nowhere aggregated. Working by entirely different methods from those used above, they obtain a total of 1,435,000.

Great Britain.—Figures calculated in *National Income and Outlay*, p. 208. Including an allowance for unrecorded unemployment.

Germany.—Calculated on p. 98 below. The numbers in wage work are shown by Health Insurance statistics from 1928 onwards, which figures are augmented by an allowance for independent traders and excluded salary-earners as calculated in the Census. These totals are compared with a hypothetical figure of occupied

population calculated by applying the 1925 ratios of occupied to total population in each age group to the age distribution of each succeeding year (Institute of Conjuncture, *Weekly Report*, 5th May 1937). It should be pointed out that this calculation sets rather a high standard of what constitutes full employment, as in the year 1925, following upon the inflation, an abnormally large proportion of the population was in work.

FRANCE.—1926 data from Census. In 1921 the proportion of the non-agricultural population unemployed was 3·7 per cent; in 1931, 2·6 per cent. The figure for 1937 is roughly computed from the decline in the statistics of employment, compilation of which began in 1930.

CANADA.—*International Labour Review*, vol. 28, p. 46 (henceforward referred to as *I.L.R.*) gives the following data:

Date	Sources	Unemployed, thousands	Percentage of Non-Agricultural Occupied Population	Trade Union Unemployment at Same Date
June 1931 .	Census	425	16 1	16·3
May 1932 .	Estimate	725	27·1	16·3
March 1933 .	Official Estimate	650	24 0	25·1

It appears in this case that the trade union figures give a very close measure of non-agricultural unemployment, and they are used in the table.

AUSTRALIA.—About 30 per cent of the occupied population consists of farmers and independent traders. It is found that by applying 7/10ths of the trade-union unemployment proportion to the whole occupied population, a very close approach is obtained to the total of unemployment as shown in the 1921 and 1933 Census.

SWEDEN.—See p. 89 below. The calculation there relates trade-union unemployment percentage to the proportion of the whole occupied population unemployed, and a new factor of 0·58 is computed for the ratio between trade-union unemployment and the proportion of unemployed in the non-agricultural population.

AUSTRIA.—Recorded unemployment is given in *League of Nations Monthly Bulletin of Statistics*, assumed to be comprehensive.

HUNGARY.—*I.L.R.* quotes Census result of December 1930 as 224,000, or 12·7 per cent of the non-agricultural occupied population as against a trade-union percentage of 17·6 at that date. A factor 0·72 is applied to the trade-union figures.

NORWAY.—*I.L.R.* quotes the following:

Date	Source	Unemployment, thousands	Data as Percentage of Non-agricultural Occupied Population	Trade Union Percentage recorded at that Date
December 1930	Census	111	14·8	27·1
November 1932	Official Estimate	158	20·9	38·8

It is assumed that a factor of 0·54 appended to the trade-union figures gives the true proportion.

GREECE.—*I.L.R.* quotes Census result for 1928 and official estimates up to 1932.

CZECHOSLOVAKIA.—*I.L.R.* quotes a figure from the Census of December 1930 of 299,000, at which date recorded unemployment was 240,000. It is assumed that an addition of 24½ per cent to the recorded figures gives the full number of unemployed.

ARGENTINE, PORTUGAL and MEXICO.—Data from *I.L.R.*

ITALY.—Published figures of unemployment assumed to be complete.

NEW ZEALAND.—From source quoted above.

SPAIN.—Data for February 1936 from De Arlandis, *Weltwirtschaftliches Archiv*, September 1936. Partially unemployed counted as half (including agriculture in which more than half of the unemployment was found) expressed as a percentage of the whole occupied population.

Figures of occupied population throughout from *Statistisches Handbuch der Weltwirtschaft*, except for Great Britain, U.S.A., Germany and France.

Average unemployment over the whole trade cycle 1925–34 ranged from 4 per cent in France and Italy to 18·8 per cent in Germany. Other high figures were shown by Hungary with 16·7 per cent, Austria with 14·3 per cent and the U.S.A. with 14·7 per cent. The figures in Austria and Hungary were high throughout, while in Germany and U.S.A. they range from very low figures in the most active years (1925 and 1929 respectively) to exceedingly high figures at the low point of the depression. The greatest severity of the depression, judging by the extent of unemployment, was found in Germany and the U.S.A., and the least in Sweden, Italy,

Great Britain, and Czechoslovakia, among the countries for which we have information. Great Britain is remarkable for showing the worst figures for the 1925–29 boom, and among the best for the 1930–33 depression.

Considerably more remarkable, however, is the varying levels of unemployment in the year 1937. The lowest recorded figures are shown by Sweden and New Zealand, followed by Australia and Czechoslovakia. But there is a general tendency to cluster round the figure of 10 to 13 per cent, Great Britain, Germany, Canada, Norway and Hungary being found within this range. In every case this figure is markedly higher than the best figure of the previous trade cycle, although in Great Britain, Sweden and Australia the deterioration is not so great. Unemployment is now considerably higher than it was over the average of the whole trade cycle in 1925–34.

We can judge approximately the extent to which unemployment has been a factor in keeping down the average level of real income in certain countries, and can apply the average rates of unemployment calculated above for 1925–34 to the figures previously obtained of real income per head. (In the previous calculations we had worked out real income per head of the occupied population taking employed and unemployed together.) We are thus making the assumption that the average productivity per head of the unemployed would have been about the same as that of those who were actually in work if the unemployed had been absorbed into industry. The following table gives the results for certain countries.

These figures go to show that unemployment, during the last decade, though a grave source of waste of economic resources, is by no means the principal factor in accounting for the poverty of so many countries of the world. There is evidence to show that as time goes on unemployment in nearly all countries is becoming a factor of more serious importance. But it is a disastrous mistake to think of labour as a homogeneous whole. In Chapter VI below is shown how serious is the extent

Average Income per Head of Working Population in International Units, 1925–34

	Employed and Unemployed taken together	Approximate Estimate for Value if all Unemployed had been at Work
U.S.A.	1368	1550
Canada	1337	1440
New Zealand	1202	1280
Australia	980	1090
Great Britain	1069	1210
Sweden	653	700
France	694	720
Germany	646	750
Norway	539	590
Austria	511	570
Czechoslovakia	455	480
Italy	343	360

of occupational maldistribution in nearly all countries where there may be a huge surplus of unskilled labour co-existent with actual shortage of labour in the skilled trades. How rapidly and under what conditions this labour can be transformed then becomes the dominating factor in the utilisation of unused productive potentialities.

CHAPTER IV

THE RATE OF GROWTH OF REAL INCOME

THE importance of careful study of the *rate of growth* of income in different countries and at different dates needs no emphasising. Some of the results obtained are very different from those which might have been expected.

We may begin by summarising the available information for each country. So far as possible, we will try to take into account the great changes in the length of the working day which have taken place in the last fifty years, in order to express our data so far as possible in the form of average real income per hour worked. Even though the data are approximate to the point of arbitrariness, to neglect this factor would be to obtain a very wrong view of the rate of economic progress.

The trend in U.S.A. between 1850 and 1937 is first examined (see table opposite).

Figures from 1850 to 1900 from Dr. W. I. King's *Wealth and Income of the People of the United States*, published in 1915. Dr. King's figures have been carefully examined to ensure that his definition of national income is similar to that subsequently used. The only adjustment necessary is the inclusion of the annual value of rents from dwelling-houses, of which he gives figures, though he does not include them in his total. Dr. King, however, has converted money into real income by use of a wholesale price index number, which is replaced by a retail price index number in the calculation above.

From 1909 to 1918 from *Income in the United States*, published by the National Bureau of Economic Research in 1921. Average of data from " Production " and " Aggregate Incomes " methods.

Data from 1919 to 1935 from Dr. Kuznetz's calculations in *National Income and Capital Formation*. Figures for 1936 and 1937 from *Survey of Current Business*.

Indirect taxation includes Federal customs revenue and State

Year	National Income, $ million	Do, including Indirect Taxation	Real National Income at 1925–34 Prices	Occupied Population, millions	Numbers in Work, millions	Hours in Normal Working Week	Hours Actually Worked	Real Income, $ per Head: Per Head of Occupied Population	Real Income, $ per Head: Per Worker in Work in Hours Actually Worked	Real Income, $ per Head: Per Worker during Normal Working Week	Real Income, $ per Head: Per Worker in 65-hour Week
1850	2 38	2 42	6 06	7 697	7 39	65 0	63 0	787	820	846	846
1860	3 96	4·02	10 96	10 53	10 12	65 0	63 0	1041	1084	1119	1119
1870	7 18	7 38	12 40	12 93	12 42	63 0	61 0	959	999	1030	1065
1880	8 03	8 25	17 97	17 39	16 0	61 0	59 0	1032	1123	1166	1238
1890	13 00	13·24	27 2	23 32	21 6	58 4	56 4	1167	1259	1303	1451
1900	19 36	19 72	40 2	29 07	27 0	57 3	55 3	1388	1490	1543	1751
1909	28 8	29 4	51 1	36 8	34 4	54 9	52·9	1388	1484	1542	1827
1910	31 5	32 2	53 0	37 4	35·5	54 6	52 9	1379	1491	1540	1832
1911	31 2	31 8	50 6	38 1	35 5	54 4	52 4	1328	1425	1480	1769
1912	33 0	33 7	53 0	38 7	36 7	54 2	52 2	1369	1443	1499	1797
1913	33 7	34 4	52 5	39 3	36 9	53 8	51 8	1333	1421	1477	1783
1914	33 2	34 0	51 5	39 6	34 9	53 5	49 8	1301	1474	1583	1927
1915	36 0	36 7	56 2	39 9	35 4	53 5	51 5	1409	1588	1650	2004
1916	45 4	46 2	65 5	40 6	38 8	53 3	51 3	1611	1687	1751	2138
1917	53 9	54 8	64 9	41 5	39 9	53 0	51 0	1562	1625	1689	2072
1918	61 1	62 0	60 2	42 0	40 3	52 2	50 2	1432	1493	1554	1932
1919	59 9	60 9	52 9	41 5	39 4	51 3	49 3	1270	1338	1394	1768
1920	72 4	73 6	55 7	41 9	39 7	50 4	49 1	1319	1404	1477	1905
1921	58 3	59 5	51 9	42 6	35·4	50 3	45·0	1215	1465	1637	2115
1922	59 7	61 0	57 1	43 3	37 5	50 5	48 5	1317	1521	1583	2040
1923	69 7	71 3	65 4	44 0	41 4	50 4	48 6	1485	1578	1639	2114
1924	70 4	72 2	66 2	44 7	40 8	50 0	46 7	1480	1623	1737	2258
1925	74 8	76 5	69 2	45 4	42 5	49 9	47 9	1523	1628	1696	2208
1926	79 5	81 2	72 8	46 2	43 7	49 8	47 8	1572	1663	1735	2259
1927	77 4	79 2	72 3	46 9	44 4	49 55	47 2	1542	1628	1711	2240
1928	80 4	82 2	76 2	47 55	45 3	49 45	47 4	1601	1681	1755	2306
1929	83 4	85 4	79 0	48 3	47 0	49 65	47 0	1636	1680	1776	2326
1930	72 9	74 9	70 7	48 9	44 9	49 3	43 9	1446	1573	1764	2325
1931	56 0	57 9	59 2	49 3	41 5	49 1	39 9	1201	1422	1751	2312
1932	39 6	41 4	46 0	49 7	38 0	48 9	34 4	926	1213	1722	2292
1933	39 3	41 2	48 3	50 0	38 2	48 6	35 6	968	1267	1731	2314
1934	47 8	49 8	56 2	50 35	40 3	45 5	34 2	1119	1396	1857	2652
1935	53·0	55 0	60 1	50 6	41 1	45 5	36 7	1188	1463	1813	2590
1936	62 5	64 7	70 8	52 2	43 6	45 5	39 3	1355	1622	1878	2687
1937	70 0	72 4	75 8	53 9	44 6	45 5	41 2	1407	1696	1872	2678

and municipal taxation of commodities (from Statistical Abstract of the United States). In round figures:

	\$ million		\$ million
1850	40	1890	250
1860	60	1900	200
1870	200	1910	380
1880	200		

Money income converted to real income by use of index figures of retail prices The use of wholesale price indexes is certainly erroneous, as the goods included in wholesale prices showed very different movements from the goods and services not included. From 1914, National Industrial Conference Board statistics of the cost of living have been used, supplemented between 1919 and 1935 by allowances for the changes in prices of capital goods and motor cars as computed by Dr Kuznetz (*loc. cit.*). Between 1890 and 1914 use is made of the cost-of-living index calculated by Professor Douglas in *Real Wages in the United States*, averaged with that calculated by Carl Snyder in *Business Cycles and Business Measurements* Snyder's figures go back to 1875. Between 1860 and 1880 retail price index numbers were calculated by Professor Mitchell in *Wages and Prices under the Greenback Standard*, and his data can be united to Snyder's over the period 1875–80. For 1850 a rough figure is calculated from data published by Professor Bowley in *Economic Journal*, 1895.

We obtain the following figures for average retail prices on 1913 base. For 1890 and 1900 Douglas's figures are given a weight of 2 and Snyder's of 1 in compiling the average, the former appearing to be more comprehensive.

1850	61	1890	74·3
1860	56	1900	74·7
1870	91	1913	100·0
1880	70		

Data for unemployment between 1890 and 1926 are taken from Professor Douglas (*loc. cit.*). His figures for percentage rate of unemployment in manufacturing, mining, building and transport are assumed to be applicable to the whole population. From 1929 onwards the numbers in work are taken from Kuznetz's data and for 1927 and 1928 interpolation is made on the basis of employment index numbers.

For the years prior to 1890, very little information is available. An interesting contemporary estimate is quoted for 1878 by Mundella, *Journal of the Royal Statistical Society*, 1878. He quotes Blair, who

had been a member of President Lincoln's Cabinet, as estimating that in the depression of that year there were 1,250,000 "artisans and labourers" unemployed in the United States. The whole occupied population at that time, excluding agriculturists, cannot have been much more than 7,500,000. We shall probably be justified in assuming that in the earlier years covered by our inquiry there were somewhere between one-quarter and one-half million unemployed.

A final adjustment is necessary before we make use of these figures to estimate the growth of real productivity, viz. the question of the number of hours worked. A full calculation of the average working week for the whole American working population was made by Professor Douglas (*loc. cit.* p. 208), covering the period 1890 to 1926.

Since 1926 no comprehensive inquiry appears to have been made into changes in the length of the average *normal* working week (as opposed to the number of hours in the week *actually* worked). The effect of the general readjustment of hours in the latter part of 1933 was to reduce the length of the normal working week, averaging together the data available, by 4·3 hours per week, below the 1926 level of 49·8 hours. For the years between 1926 and 1933 an estimate has been made from the reports prepared (in alternate years for different industries) by the United States Bureau of Labor of the average number of working hours.

Taking average normal working hours in 1926 as base, we have figures showing:

(*a*) For the years 1928, 1930, 1932, changes in hours in the cotton, wool, clothing, hosiery, boots, motor and leather industries, and

(*b*) For the years 1927, 1929, 1931 and 1933 (first half of year), changes in hours in the iron and steel, engineering, meat-packing and furniture industries.

Within each of these groups a weighted average can be constructed according to the relative importance of the different industries, and the two combine together (see table overleaf).

For the years since 1929, however, the week actually worked has differed very considerably from the "normal" working week. For the year 1914 and at regular intervals since 1920 the National Industrial Conference Board has obtained returns from 24 industries showing the average length of week actually worked, as compared with the average normal week. The largest difference, that is to say the greatest average amount of short time, was in the year 1932, when it amounted to 14·5 hours per week. The lowest figure recorded

was for the year 1923, when it was 1·8 hours. Figures of 2 hours were shown for 1922, 1925, 1926 and 1928. The figure for 1914 was 3·7 hours. At the time of writing (early 1937) the figure was 3·4 hours. If for the sake of completeness we wish to construct a table showing average productivity per hour actually worked rather than per hour of the normal working week, we should clearly use the adjusted figure, which takes account of short time. For the earlier years, for which we have no information, we are probably justified in assuming an average of about 2 hours a week lost through short time, though clearly the amount of short time must have been greater in the earlier depression years, and may have been less in the very early period.

NORMAL WORKING HOURS (1926 = 100)

Year	Weighted Average of Group A	Weighted Average of Group B	General Average
1926	100·0	100·0	100·0
1927	..	99·5	99·5
1928	99·3	..	99·3
1929	..	99·7	99·7
1930	99·2	..	99·0
1931	..	97·9	98·6
1932	98·9	..	98·2
1933 (first half year)	..	96·3	97·6

Some figures of real income per head in years prior to 1850 are given by the National Industrial Conference Board (Weekly Chart Service, No. 133, 15th July 1938). Income in 1926 dollars per head of population (occupied and unoccupied) was given as $240 in 1850, having risen from about £160 in 1820 and 1830. For 1800 and 1810, however, it was given at some $200 (all at 1926 prices). This retrogression (if substantiated) is of considerable interest.

Great Britain

The figures given in *National Income and Outlay* give average real national income per head at 1913 to 1930 prices from 1860 to the present time, with some evidence regarding the level of income in the seventeenth century. The correction for changes in working hours is based on data quoted by Professor Bowley in *Wages and Income.*

Years	National Income produced per Head of Occupied Population, £ per annum at 1930 Prices	Do., in International Units	Assumed Average Hours	Assumed Average Hours on 48-hour Week Basis
1688	69·0	378	65·0	279
1860–69	116·2	638	58·8	521
1870–76	118·7	651	57·1	546
1877–85	141·7	777	54 3	687
1886–93	154·7	849	54·3	750
1894–1903	175·8	964	53·5	865
1904–10	182·3	999	53·2	901
1911–13	192·7	1057	53·2	953
1913	195·4	1071	53·2	966
1924	186·2	1020	48 0	1020
1925	196·5	1077	48·0	1077
1926	191·3	1048	48·0	1048
1927	197·3	1082	48·0	1082
1928	198·8	1090	48·0	1090
1929	206·8	1133	48·0	1133
1930	201·8	1107	48·0	1107
1931	183 6	1006	48·0	1006
1932	181·0	932	48·0	932
1933	188·3	1032	48·0	1032
1934	199·2	1093	48·0	1093
1935	208·8	1145	48·0	1145
1936	218 5	1198	48·0	1198
1937	233·3	1275	48·0	1275

1836 and Earlier General Average (Giffen), 66. 1886 General Average (Giffen), 55				
Years	Textiles	Building	Engineering	Average of Above
1860–69	60	56·5	60	58·8
1870–76	59	54·5	58	57·1
1877–85	56·5	52·5	54	54·3
1886–93	56·5	52·5	54	54·3
1894–1903	56·5	50·0	54	53·5
1904–10	55·5	50·0	54	53·2
1911–13	55·5	50·0	54	53·2

A 48-hour week is presumed to have prevailed from 1924 onwards.

The figure for 1688 is based on the present author's analysis and revaluation of Gregory King's calculations

as given in his *Political Conclusions*. Income per head of population (occupied and unoccupied) in 1688 was revalued at £29 at 1913 prices. Other estimates prior to 1860 are those of Smee for 1847 (*Journal of the Royal Statistical Society*, 1847) of £370 m. and of the Rev. Beeke for 1800 (in his book *Produce of the Income Tax*) of £217·5 m.[1] For price comparisons, the composite price index used in *National Income and Outlay* for deflating income is available back to the period 1860–69 and from there onward the Sauerbeck and Jevons series must be used. Prices (1913 = 100) are thus put at 93 for 1847 and 165 for 1800. Real income per head at 1913 prices thus becomes £12·6 for 1800 and £20·0 for 1847, or 121 and 193 I.U. per worker respectively. It seems at first almost incredible that average real income should have fallen from a fairly high level in the seventeenth century to an Asiatic standard at the beginning of the nineteenth, and that the Stuart standard of living was not regained till the 1850's. Yet supporting evidence is not lacking. Tucker (*J.Am.S.S.*, March 1936) shows that the real wages of London artisans were halved between 1730 and 1800, and in 1688 they may have been higher than in 1730. Those familiar with the writings of Cobbett, or even with memories still living among old men in the English countryside, will not find it hard to believe almost any figure of the depths to which the standard of living of the working population had sunk in the early nineteenth century.

Australia

In *The National Income of Australia* figures of real national income have been quoted per head of the occupied population, employed and unemployed,[2] at 1923–27 prices, on the basis of a 45-hour week. To reduce these data to the price level of 1925–34 they must be

[1] MacCulloch's estimate for 1837 gives net agricultural income a share of more than 80 per cent of his total, a far higher proportion than in Rev Beeke's. This makes his figure untenable.

[2] *Loc. cit.* p. 71: "Real Income per person in work" less "Loss through unemployment" and "Overseas interest and dividends". Ratios for earlier years assumed to be the same as for 1901–3.

multiplied by the factor of 0·915, to reduce them to international prices must be divided by a further factor of 1·259, and multiplied by 4·867 to convert pounds into dollars at par. They must then be raised by the factor 48/45.

Years	Real Income available per Person in International Units on 48-hour Week Basis
• 1886–87	551
1888	597
1889–90	652
1892	696
1898	741
1901	645
1901–3	665
1914–15	742
1916–17	741
1917–18	697
1918–19	718
1920–21	754
1921–22	911
1922–23	951
1923–24	969
1924–25	1019
1925–26	1051
1926–27	1129
1927–28	1105
1928–29	1127
1929–30	1088
1930–31	868
1931–32	939
1932–33	972
1933–34	1016
1934–35	1094
1935–36	1169
1936–37	1182
1937–38	1212

Russia

Approximate figures indicative of the rate of growth of recent national income are taken from *Critique of Russian Statistics*. Average real income per head in terms of sterling at 1934 purchasing power was calculated for the four years 1913, 1928, 1934 and 1937. Data

were also obtained to show that the increase in average real income per head between 1900 and 1913 was 8 per cent, and between 1870 and 1913 was approximately 20 per cent.

Year	Real Income per Head in Sterling of 1934 Purchasing Power	Do, International Units
1870	50·5	264
1900	55·1	288
1913	58·5	306
1921	22·4	117
1923	35·4	185
1925	53·5	280
1928	55·5	290
1934	51·0	267
1937	72·3	379

Figures for 1921–26 were taken from the table calculated by Prokopovitch and quoted above.

No allowance has been made for unemployment or for changes in working hours. Data are available to show the reduction in industrial working hours since 1913, but the change is small in comparison with the size of the non-industrial population. So far as rural workers are concerned there is some indication that the extent of their (unavoidable) leisure has increased.

Sweden

For Sweden the entire field of development of national income between 1861 and 1930 has been exhaustively investigated for the Institute of Social Sciences of Stockholm University.[1]

The definitions used in this study differ slightly from those used elsewhere. All indirect taxation is included in the national income, on the same grounds as those urged by the present writer, namely, that the effects of such taxation are reflected in the index of commodity prices which must be used for the conversion of figures of money income into real income, and therefore the proceeds of such taxation must logically be included within the national income The authors also follow the principle used by the German statisticians, namely that of the outlay on public services, some (roads, police, etc.) should be regarded as a necessary cost involved in the production of other goods and services, while others, such as public educa-

[1] *National Income of Sweden, 1861–1930*, by Erik Lindahl, Einar Dahlgren, Karin Kock. London, 1937.

Years	National Income as given (not including Unpaid Domestic Work), million kr	Do, on Comparable Basis for International Comparisons	Real Income * per Head (Arbitrary Units) adjusted for International Comparisons	Average Hours per Year	Unemployment as Percentage of Whole Occupied Population	Income per Head in International Units per Head of—		
						Occupied Population	Persons in Work	Do, on 48-hour Week Basis
1861–9	680	686	37·0	3298	2·0	205	209	159
1870–76	1005	1012	46·6	3292	2·0	259	264	201
1877–85	1095	1102	49 0	3246	2·5	272	279	215
1886–93	1185	1186	57·4	3275	2 6	318	327	250
1894–1903	1664	1658	73·5	3141	2·5	408	419	334
1904–10	2406	2381	88·4	2985	2·1	490	500	419
1911–13	3034	2990	99·4	3000	2·1	551	562	469
1913	3230	3179	102·2	2994	1·8	567	578	482
1914	3397	3341	105·0	2916	3 0	583	601	515
1915	3987	3925	106·5	3035	2·9	591	608	501
1916	4909	4860	114·5	3110	1 6	635	645	518
1917	5911	5809	108·0	3022	1 6	599	609	503
1918	7589	7522	99·0	2874	1·9	549	560	486
1919	8895	8746	99·5	2770	2·2	552	565	510
1920	10472	10322	114·0	2445	2 2	632	646	666
1921	7296	7182	91·5	2286	10 8	508	570	623
1922	6459	6372	100·0	2426	9·3	555	611	629
1923	6482	6379	106·5	2474	5·1	591	622	629
1924	6690	6576	108·0	2535	4 1	599	625	616
1925	6916	6791	109·0	2518	4·5	605	633	628
1926	7048	6924	114·0	2546	5·0	632	666	655
1927	7210	7075	117·0	2560	4·9	649	682	666
1928	7367	7224	117·5	2472	4 3	652	681	690
1929	7862	7714	125·5	2546	4·2	696	726	712
1930	7744	7596	126·5	2494	4 9	702	738	740
1931	7030	6880	118 8	2415	6 8	659	707	731
1932	6500	6350	110·3	2356	9 1	613	674	715
1933	6550	6400	112·9	2358	9 6	626	693	734
1934	7370	7220	125·3	2436	7·7	696	755	774
1935	8060	7910	135 8	2446	6·5	754	805	821
1936	8660	8490	142·0	2466	5·5	787	834	845

* Real income per head on 1910–13 basis as given in *National Income in Sweden*, adjusted by ratio between two previous columns

tion, should be regarded as a form of consumption expenditure. Until an agreed definition can be obtained and inconsistencies cleared up, it is thought better to retain, for the purposes of international comparison, the definition used in all other countries. The costs of public services thus deducted as "costs" are therefore added back to the figures of Swedish national income. These figures also include an allowance for the imputed value of all durable consumers' goods. They include not only dwelling-houses but also crockery, household china and glass, bedding and carpets (which are given an average durability of 5 years), motor cars, bicycles, hardware, leather goods, furs and linoleums (which are given an average life of 10 years), and furniture and books, which are given an average life of 20 years. Most interesting calculations in this field (which were made for the Institute by Mr. C. Holstedt [1]) are unique and have never in the world been attempted before on so wide and accurate a scale. It is interesting to find that the aggregate imputed annual value of all durable consumption goods other than dwellings was in 1930 only 321 million kr. as against 781 million kr. for rents of dwellings. At the beginning of the present century the discrepancy was wider; imputed annual value of all other durable consumable goods was only one-third of rents of dwellings, and in 1870 was only 10 per cent. These broad conclusions are probably applicable to other countries, namely, that until a high standard of living has been reached the annual net flow of values from other durable consumable goods is trifling in comparison with the rents of dwellings, but that after a certain stage has been passed they increase rapidly.

Similar calculations were attempted rather roughly for the United States of America by Dr. King [2] and also by the Brookings Institute.[3] They put the imputed income from durable consumption goods other than dwelling-houses at half of rents in 1909 rising to 72 per cent of the income from rents in 1929.

In default of statistics of other countries, or of post-1929 statistics for the U.S.A., it is necessary to omit these data for the purposes of international comparison. It will be seen, however, that only in the U.S A., and other countries of very high standards of living, will an appreciable difference be made to the result.

A computation is made of the imputed value of the unpaid domestic work performed by women in their own homes, but this factor is not included in the calculation of changes in real income per head. It is pointed out that the omission of this factor may cause a slight exaggeration in the apparent rate of growth of real income

[1] *Loc. cit.* Part II. pp. 546–53.
[2] *Income in the U.S.A.*, editions published in 1921 and 1929.
[3] *America's Capacity to Consume*, 1934.

per head, on the grounds that a larger proportion of women are now engaged in paid work, and that the money income thereby produced would be to some extent produced at the cost of a smaller output of unpaid services. The ratio of unpaid services to money national income, however, is found to have changed only very slightly between the 1860's and the present time.

The source above quoted gives figures for each year from 1861 to 1930. An appendix contains figures calculated by Dahlgren for the years 1930–34 on a slightly different basis, which is joined to the existing series. The net effect of the adding-back of public services and the exclusion of imputed income from durable consumers' goods in 1930 was a deduction of 2 per cent, and a similar deduction is assumed to be applicable to later years. Approximate figures for 1935 and 1936 are taken from a recent article by Lindahl.[1]

Statistics of the occupied population in Sweden, for every year prior to the Census of 1920, are intolerably defective. In the earlier years occupied persons and dependants were hopelessly confused and the definitions of occupations were vague and constantly changing The Institute have therefore made practically no use of these data in their investigations When expressing changes in income per head they use instead data of the whole population aged between 15 and 65. A comprehensive cost-of-living index number, including an index for building costs, is used to reduce money income to real income. A continuous series of index numbers are prepared for the period 1861 to 1930, and carried forward to 1935 and 1936 on the basis of the figures quoted by Lindahl in his recent article.

These figures of income per head can be reduced to international units by comparison, based on the period 1925–34. Two other allowances have still to be made, namely for unemployment and for changes in working hours. Trade union figures of unemployment [2] are available since 1911. A series relating to Stockholm only is quoted back to 1874. For the three years 1911–13 the Stockholm figures average 6·6 per cent and the trade union figures for Sweden as a whole average 5·5 per cent. To obtain a continuous series the Stockholm figures for the earlier years are reduced in this proportion.

It must not be assumed that the trade union figure is fully representative of unemployment, particularly among the rural population.

In May 1937, when the trade union figures stood at 8·1 per cent, the entire unemployment in Sweden was estimated at between

[1] Skandinaviskå Kreditaktiebolaget Quarterly Circular, July 1937.

[2] Quoted from *Arbetsloshetens Omfattning Karaktar och Orsaker*, Social Department, Stockholm, 1931. Recent figures from *League of Nations Monthly Bulletin of Statistics*.

80,000 and 100,000,[1] which only amounts to 3·3 per cent of the whole occupied population as shown at the 1930 census, or 4·7 per cent of the total estimated 1937 occupied population excluding agriculturists. It is assumed, therefore, that the trade union percentage multiplied by 0·406 gives a measure of the true extent of unemployment as applicable to the occupied population (including agriculturists) as a whole.

Exact figures of the average number of hours worked per year can be computed from comparison of annual and hourly earnings given in *Wages in Sweden* [2] up to 1930. For subsequent years data are based on returns published by the International Labour Office.[3] For years from 1933 onwards are published Employers' Returns showing the average length of the working week. Approximate figures are calculated for 1931 and 1932 based on comparison of figures of hourly and daily earnings published by the International Labour Office.

Sweden is one of the few countries for which we have any figures of hours of work in agriculture. At present (*I.L.R.*, May 1939, p. 639) annual hours are about 2500 for agricultural workers and 2800 for stockmen, thus not differing greatly from industrial hours. Other data are given to show that hours fell by 5·8 per cent between 1913 and 1928, most of the fall occuring between 1916 and 1920.

For the years up to 1913, the figures for individual years are combined into seven- or ten-year averages each covering the whole period of a trade cycle. The years were chosen so as to facilitate comparison with figures of Britain and Germany already quoted. The principle on which they were chosen was that each period should end approximately three years after the years of peak activity of each trade cycle. Study of the diagram of changes in the volume of industrial production in Sweden shows that the course of the trade cycle for that period was very much the same as in Great Britain.

Germany

Figures of the growth of real income per head can be obtained over the period 1854 (approximate data to 1913, and annually from 1925). Between 1877 and 1910 the figures are combined for periods of seven to ten years each to cover an entire trade cycle, to facilitate comparison with Great Britain, where the same dates are used, and to avoid the chance elements sometimes affecting the data for single years.

[1] Geoffrey Wilson, *New Fabian Research Quarterly*, No. 15, 1937.
[2] Pages 48 and 255. [3] *I.L.O. Year Book.*

In the case of national income statistics in Germany we are confronted with an unusual situation. The lack in this country is a lack of adequate retail price statistics. The Statistisches Reichsamt (Einzelschrift, *Die Deutsche Volkseinkommen*, published in 1932) has prepared a continuous series of national income figures from

Years	Real Income per Head in International Units	Assumed Average Hours	Real Income per Head on 48-hour Week Basis
1854	420	70	288
1877	632	66	460
1877–85	720	66	524
1886–93	769	64	576
1894–03	808	$62\frac{1}{2}$	621
1904–10	829	61	652
1913	881	60	705

1913 back to 1891, on the same basis, with the same degree of precision, as the current series of estimates from 1925 onwards. There is no other country in the world in which such good national income figures are available over this period, available moreover on a strictly comparable basis with the post-war figures.

To reduce these figures to real incomes, however, the Statistisches Reichsamt themselves were unable to find a satisfactory retail price index number for years earlier than 1901. For the previous ten years they made an ingenious extrapolation, using data of wholesale prices. Account is taken of the relative trends of wholesale and retail prices (where the difference is slight) and also of their relative cyclical movements (a more important adjustment).

For the years prior to 1891 are available a series of figures of Prussian national income by Soetbeer The basis on which he worked is not quite clear, and comparison of his figure of income per head for 1890 with that of the Reichsamt for 1891 shows that his figures were defective to a considerable degree — at any rate by the modern definition. The fact that, throughout this early period, however, Soetbeer was able to cover a large part of the national income from taxation statistics, the exemption limit being low, makes his result deserving of consideration. Soetbeer's figures from 1876 to 1890 are those quoted by Neumann-Spallart in *Uebersichten der Weltwirtschaft.* An isolated figure for 1854 is quoted by Prokopovitch (*Economic Journal,* 1926) in the course of a survey of income distributions.

The figures calculated by the Reichsamt, using the post-war definition, and inclusive of indirect taxation were as follows :

National Income of Germany, 1891–1913
(Milliard marks)

1891	24·8	1899	29·8	1907	39·7
1892	24·8	1900	30·9	1908	40·9
1893	25·0	1901	31·3	1909	42·5
1894	25·7	1902	31·8	1910	44·0
1895	25·9	1903	32·6	1911	45·6
1896	26·7	1904	33·8	1912	47 6
1897	27·6	1905	35·2	1913	50·1
1898	28·6	1906	37·7		

Soetbeer's figure for Prussia in 1890 was 10 milliard marks, at which date Prussia included just over 60 per cent of the population of Germany. The difference must be accounted for by the exclusion of certain incomes of non-taxpayers, incomes from public enterprises, indirect taxation and other questions of definition.

Using the year 1891 to establish a ratio between the old series and the new, we have:

Year	(Millard marks)	
	Soetbeer's Series	Estimate for Whole of Germany
1890	10·0	24·8
1888	9·36	23·2
1885	8·72	21·6
1881	8·41	20·8
1880	8·33	20·6
1879	8·25	20·4
1878	8·24	20·4
1877	8·11	20·1
1876	8·02	19·85

For 1854 Prokopovitch quotes a figure for Prussia of 218 marks per head as against 303 marks in 1875. On this basis we estimate very approximately a national income of 11·1 milliards for Germany in 1854.

For prices, as is pointed out above, we have no adequate series of retail prices extending back earlier than 1900. We have the following series:

(i) Wholesale price index series, 1792–1913, calculated by the Institut für Konjunkturforschung and published in *Statistisches Jahrbuch*, 1936.

(ii) Otto Schmitz (*Bewegung der Warenpreise in Deutschland*) gives wholesale price series 1851–1900. This series shows prices

in the period 1858–1870 to have been 10 per cent or more above the 1900 level, while series (i) shows them to have been almost the same. This is the maximum disagreement.

(iii) Bowley (*Economic Journal*, 1898) quotes some isolated figures of retail prices for 1874–92. Their movements are in close agreement with those of (i). The figures which he quotes are:

1874–1883 . .	100
1889 . . .	96
1881–1891 . .	90
1892 . . .	100

This lack of a retail price index is a serious drawback. Its effects are more serious on the data for individual years than on the data showing the long-term trend, for, as the Reichsamt have shown, it is in cyclical price-movements that the differences between wholesale and retail prices are most marked. In the long-term trend the differences are less, though not absent.

The procedure therefore adopted is as follows. Series (i) of wholesale prices is used, and calculations of real income are made for the average of each completed cycle. No attempt is made to obtain real-income figures for individual years. The demarcation of trade-cycle periods is the same as that used for Great Britain and Sweden.

For calculating the numbers of the occupied population, we have data from the Census of 1882, 1907, 1925 and 1933, which were conducted on a uniform basis. To bring the figures into line with the post-war classification of occupied populations used in international comparisons, it is necessary to exclude figures of females engaged in agriculture. This is necessary also to preserve comparability among the figures themselves: owing to a change in definition, the recorded number of females engaged in agriculture rose by nearly a million and a half between 1895 and 1907.

We have the following figures:

Year	(Millions)		Per cent of Total Population
	Occupied Population	Do less Females engaged in Agriculture	
1933	32·30	27·65	41·9
1925	32·01	27·09	42·8
1907	25·16	21·16	34·1
1895	19·76	17·26	33·2
1882	16·88	14·36	31·4

The ratio of occupied to total population rose steadily as the proportion of children in the population declined until 1925, and

then fell. These data are used as a basis for estimating the proportions in each of the specified periods shown below.

In order to construct a continuous series of data showing changes in real income per head between 1854 and the present time, it now only remains to obtain a price-link between 1913 and 1925–34. It is calculated from wholesale and retail price indexes, using as weights the estimated values of consumption shown in the *Wirtschaftsrechnung* of 1927–28, and of investment from the I.f.K. estimates of the total of net investment in Germany at the same date. The ordinary cost-of-living index number would provide a fairly good approximation, but it does not cover investment goods, and being an index representative of working-class consumption, gives too high a weight to food and rent at the expense of other consumption goods. Investment goods are represented by building costs and by the wholesale price index numbers of industrial and agricultural equipment.

	(Base 1925–34 = 100)			
	Weights	1913	1928	1935
Consumption goods :				
Food	36	72·6	111·1	87·5
Rent	10	86·9	109·0	105·2
Clothing . . .	13	68·1	116·0	76·8
Fuel	4	75·0	102·2	94·5
Others . . .	26	62·4	106·0	97·6
Investment goods :				
Building . . .	5	63·6	114·4	83·8
Agricultural equipment	1	77·6	108·2	86·2
Industrial equipment .	5	77·6	105·9	88·1
TOTAL . .	100	70·7	109·6	90·6

We can now compile the final table (see top of next page).

The only confirmatory source of information for the earlier years is from certain calculations of the volume of industrial production in Germany since 1860. These calculations were originally made by Wagenfuhr in *Die Industriewirtschaft* (Institut fur Konjunkturforschung, 1932), and published also in *Konjunktur-Statistisches Handbuch* The volume of industrial production in Germany, according to these calculations, was in 1860 only about 14 per cent of the 1913 level, in 1877–85 about 28 per cent. In 1891, the first year for which we have an accurate estimate of national income, the volume of industrial production was still only 41 per cent of the 1913 level.

The net values of industrial and agricultural production were

ACTUAL BOUNDARIES OF GERMANY IN EACH YEAR : 1935 INCLUDING SAAR

Years	Population	Occupied Population	National Income, milliard marks	Do, on International Definition (addition assumed Proportionate to National Income)	Do, at 1925–34 Prices	Do, per Occupied Person
1854	34·6	10·7	11·1	11·5	16·25	1520
1876	43·06	13·32	19·85	20·50	30·52	2293
1877–85	45·30	14·21	20·83	21·50	36·92	2600
1886–93	48·95	15 86	23·82	24·59	44·09	2776
1894–1903	54·86	18·38	29·06	30 00	53·5	2914
1904–10	62·02	21·13	39·14	40·41	63·35	2996
1911–13	66·16	22·66	47·77	49·32	70·65	3116
1913	66·98	23 02	50·13	51·76	73·15	3185
1925–34	..	27·22	..	63·55	63·55	2338

computed in 1928 at 33·7 and 9·8 milliard marks respectively. From price and volume index numbers it may be computed that the 1913 figures were 21 milliards and 7·5 milliards respectively. The remaining 32 milliards of national income in 1928 comprised 8 milliards net output of "Hand-work" (small craftsmen, bakers, builders and others not included in the industrial statistics) and 24 milliards of services. The net output of "Hand-work" in 1913 can be put at 5 milliards, leaving 16·6 milliards to represent the output of services, and indirect taxation.

The working population was distributed as follows :

	(Millions)		
	1852	1891	1913
Agriculture .	6·3	6·3	6·2
Industry and hand-work .	5·8	7·1	11·0
Services . .	2·1	2·5	5·8
	14·2	15·9	23·0

In 1891 the national income, re-expressed at 1913 prices, was 30 milliards.

The net output of industry, which was 21 milliards in 1913, can be put at 8·6 milliards for 1891, in marks of 1913 purchasing power, if we use the index number quoted above. On this basis the net output of industry contributed only 30 per cent of the national income in 1891 and probably only employed about 30 per cent of

the working population, as nearly 4 millions of those shown under this heading would have been hand-workers.

But with this consideration in mind, we can see that a real national income of 69 per cent of the 1891 figure in 1876, or 37 per cent of the 1891 figure in 1854, as shown by the above table, are not inconsistent with industrial production of 57 per cent of the 1891 level in 1876, and 33 per cent of the 1891 level in 1860.

It will be remembered that the definition of national income used by the German Statistical Authorities differs from that used in other countries Their figure includes in effect the proceeds of all indirect taxation, deducting, however, the amount spent on public services adjudged to be a necessary cost incurred for the sake of production as a whole, e.g. roads, justice. By examination of the net additions made under the heading of "In Privateinkommen nicht enthaltene Steuern" compared with public expenditure as a whole, an estimate can be made of the amount to be added. Between 1933 and 1935 entries under the above show virtually no change, while the proceeds of taxation rose by 4 milliards. It appears, therefore, that the armaments and other public services on which all this additional revenue has been spent are, for national-income purposes, being treated as necessary costs of production, and should be added back to national income to obtain a valid comparison with national income as defined in other countries. An addition of 8·25 milliard marks appears necessary on this account in 1936. Figures of public expenditure as opposed to revenue have not been published since 1934.

Changes in the number of "Occupied Population in Work" can, since 1928, be determined by making certain additions to the number of contributors to health insurance. Figures on a uniform basis are calculated by the Institut für Konjunkturforschung.[1] Comparison of their figures for 1933 with the Census of that year shows that there were approximately 2·5 million wage- and salary-earners [2] *in work* not included under health insurance These would be largely public servants and their number is assumed to remain constant. The remainder of the working population other than unemployed consist of 7·14 millions of employers and independent workers with members of their families also occupied, women members of agri-

[1] *Konjunkturstatistisches Handbuch* and fortnightly reports.

[2] An analysis is given in I.f.K. (22nd August 1935) of this figure, comprising 1 57 million public officials, 0·33 million sick, 0·26 million higher salaried employees, and certain others not included in the health insurance statistics, making 2,490,000 workers altogether. By 1935 this total was estimated to have risen to 2.6 millions. The 1933 figure includes the Forces of that date but subsequent increases have to be entered separately. (Estimates by *Economist*, 9th July 1938.)

	1913	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
		(Post-war boundaries)													
National income, milliard marks	45·7	60·0	62·7	70·7	75·4	75·9	70·2	57·5	45·2	46·5	52·7	58·6	64·9	71·0	76·0
Ditto, including public services	49·2	61·7	64·6	72·9	77·6	78·2	72·5	59·3	46·7	48·2	56·4	64·3	73·2	80·6	85·6
Ditto, at 1925–34 prices .	69·6	59·1	62·1	68·4	70·7	70·3	67·2	59·6	53·1	56·3	64·5	72·6	81·9	89·5	94·7
Occupied population in work, millions	20·3	27·8	26·1	27·1	26·76	27·42	25·98	23·93	22·13	22·71	24·77	25·74	26·93	28·22	29·41
Real income per head marks .	3430	2126	2380	2520	2640	2560	2585	2490	2404	2476	2604	2822	3040	3164	3220
Ditto, international units	957	588	658	696	729	707	714	688	664	684	720	780	840	875	890
Average hours per day .	10·0	7·66	7·3	7·7	7·66	7·67	7·37	7·08	6·91	7·16	7·43	7·41	7·59	7·68	776
International units per head on 48-hour week basis .	766	614	721	724	760	737	775	778	768	764	774	842	884	911	918
Occupied population, millions	.	28·44	29·41	29·61	30·19	30·61	30·61	30·57	30·48	30·35	30·37	30·60	30·91	31·23	31·5
Ditto new basis	..	..	..	.	..	..		.	28·48	28·35	28·37	28·60	28·91	29·23	29·5
Members of Forces not included in statistics of occupied population in work, millions .	..	..	..	..	.	..	..	..	.	.	0·1	0·1	0·4	0·6	0·9
Unemployment, millions. .	0·3	0·6	3·3	2·5	3·43	3·19	4·63	6·64	8·35	7·64	5·50	4·76	3·65	2·41	1·19
Percentage of occupiable population excluding agriculture	..	2·4	14·2	10·6	14·2	13·0	18·8	26·8	34·0	31·3	22·4	19·3	14·7	9·5	4·7

cultural families counted as not being occupied. The corresponding number with the Census of 1925 was found to be 6·96 millions. A slow upward trend is assumed to have continued since 1933 in the combined total of employers, independent workers, and wage- and salary-earners not covered by health insurance. Estimates for 1926 and 1927 are made on the basis of changes in the trade-union unemployment percentage. Average hours per day worked by industrial workers since 1928 are shown in the official *Statistical Year Book*. For 1925–27 estimates must be made on the basis of trade-union figures of the proportion in short-time work Average working hours in 1913 were taken at 10 per day

The figures of employable population, and hence of unemployment, are based on the calculation made for the Institute of Conjuncture (published in fortnightly bulletin, 5th May 1937). Taking as standard the population of occupied to total population in each age group as shown by the 1925 Census, they calculated the number of " employables " in each succeeding year on the basis of changes in the age composition of the population, and compared these with changes in the numbers actually employed. In the 1933 Census it appeared that in several age groups the ratio of occupied (including unemployed) to total population was considerably lower than it had been in 1925, and from these ratios the figures of " Occupied population, new basis " are computed. Whether this change was due to prolonged unemployment, or to some other economic or social changes, cannot be determined. But it is clear that the " new basis " cannot now give a true measure of the occupied population. It would require a negative unemployment to make the data fit the "new basis" now. On the other hand, German occupied population had not yet fully gone back to the " old basis " in 1938, as registered unemployment in that year was much below the unemployment figure computed from the " old basis " occupied population. By 1939 the " old basis " was probably fully regained.

France

Years	Real Income per Head, I U.	Ditto on 48-hour Week Basis
1850–59	382	255
1860–69	469	313
1870–79	597	398
1880–89	645	479
1890–99	735	576
1900–09	814	644
1911	786	622

From 1920 to 1934 we have .

Year	National Income, milliard francs	Do , including Taxation	Price Index		Income at 1925–34 Prices	Occupied Population, excluding Women engaged in Agriculture, millions	Real Income per Head, thousand francs	Do , I.U	Do , on 48-hour Week Basis
			Consumption	Investment					
1920	110	122	364	..	180	18 0	10 0	565	538
1921	115	129	329	.	211	18 0	11 7	661	634
1922	119	134	315		228	18 0	12 65	715	686
1923	134	150	355	.	227	18 0	12 6	712	683
1924	155	173	390		238	18 0	13 2	745	713
1925	172	191	415		247	18 0	13 7	774	745
1926	208	234	487	102	246	18 0	13 65	761	727
1927	210	238	508	89	247	18 08	13 65	761	725
1928	227	257	525	89	259	18 17	14 25	805	777
1929	245	275	600	95	245	18 25	13 4	757	735
1930	243	276	620	92	240	18 34	13 1	740	714
1931	229	267	601	75	244	18 42	13 25	748	754
1932	206	231	564	67	226 5	18 42	12 3	695	736
1933	199	224	539	66	229	18 42	12 4	700	712
1934	178	203	515	65	217	18 42	11 8	667	692
1937	172	202	624	125	167	18 42	9 06	512	615

Figures of real wages are available to confirm the otherwise very unexpected conclusion that average real income per head in France reached a maximum quite early in the present century and has been virtually stationary since that date.

There seems to be little doubt that there was a tremendous expansion of both real and money incomes between 1789 and 1813, also confirmed by figures of real wages and industrial production.

There appears to be some evidence that there was an actual decline in real wages between 1813 and 1840, or at any rate that the rate of increase was much slowed down.

For the period between 1789 and 1911 it is literally true to say that estimates of national income in France were as numerous as for the rest of Europe put together. De Foville in *Dictionnaire des Finances* quotes a list of nine estimates, concluding with his own estimate for 1893. Designating this source as (i), we have also information from the following sources :

(ii) Leone Levi, *Journal of the Royal Statistical Society*, 1860, p. 40.
(iii) Leone Levi, *ibid.*, 1884, p. 7.
(iv) Neymarck, *ibid.*, 1889, p. 326.
(v) Coste, *Journal de la Société de Statistique de Paris*, 1891.

(vi) Levasseur, *Questions ouvrières*, 1907.
(vii) Simiand, *Le Salaire*, 1931, quotes from Neumann-Spallart's *Uebersichten der Weltwirtschaft*.
(viii) Pupin, *La Richesse privée française avant la Guerre*.
(ix) Simiand also compiles a new series based on data of the value of production, comparing other years with 1891.

The following is a comparison of the estimates, in milliards of francs:

1789.	D'Agier (i)	2·5
	Neymarck (iv)	between 3 & 5
1800.	Neumann-Spallart (vii)	5·4
1817.	Poussielgue (i)	3·8
1830.	Neumann-Spallart (vii)	8 8
1840–48.	Cochut (i)	5·7
	Vignes (i)	10·0
1848–49.	Goudchaux (i)	6·0
	Passy (i)	6·0
	Neumann-Spallart (vii)	10·0
1850.	Simiand (ix)	9·7
1860.	Cochut (i)	16·0
	Levi (ii)	11·3
1861.	Neumann-Spallart (vii)	16·0
1866.	Levasseur (vi)	18·0
1870.	Wolowski (i)	20·0
1877.	Levasseur (vi)	25·0
1880.	Simiand (ix)	22·7
1884.	Levi (iii)	25 0
1890.	Coste (v)	22·5
1892.	Neumann-Spallart (vii)	25·0
1893.	De Foville (i)	25·0
1894–95.	Levasseur (vi)	22·5
1900.	Simiand (ix)	25·7
1903–11.	Pupin (viii)	33·6
1910.	Simiand (ix)	33·5
1911.	Pupin (viii)	36·0

The outrageous discrepancies of the earlier years make the figures quite valueless, and no attempt is made to base conclusions upon them. It is clear that there must have been at that time wide differences, not only in the source and accuracy of the data used, but in the definition of national income itself. From 1860 onwards the data show rather more consistence among themselves, and some conclusions can be drawn.

Data concerning levels of real wages can also be calculated and

from 1870 onwards give a confirmation of the general trend of national income. The source of data as to wages, and also retail prices, is from Simiand's great work. Unfortunately, for the earlier years, in which we hoped that real-wage figures would serve to indicate the general trend of productivity in the absence of accurate income statistics, we find serious conflict between Simiand's figures and those of De Foville. Simiand quotes figures of agricultural wages on an 1892 basis (for males), while De Foville (in *La France Économique*) quotes average male agricultural wages per day in francs. Converting De Foville's figures back into francs on the basis of information which he gives, we have the following :

Year	Average Wage per Day, Men employed in Agriculture	
	Simiand	De Foville
1892	2·30	..
1882	2·44	..
1872	..	2·00
1862–63	2·06	1·85
1852	1·56	1·42
1840	..	1·30
1813	..	1·05
1810	1·68	..
1801	1·42	..
1789	0·99	0·60
1700	..	0·50

With such discrepancies between figures of the average earnings of those who, prior to 1850, made up the bulk of the French wage-earning population, it is unfortunately impossible to compile any general figure of real wages.

From 1851 onwards an attempt may be made to calculate changes in real wages. Simiand gives (vol. 3, pp. 99-100) general index numbers, based on the year 1891, for various dates between 1851 and 1921 of wage rates for agricultural and non-agricultural occupations. From data which he gives of the number of wage-earners in the two types of occupation at each date it is possible to compile a weighted average, and these figures are quoted in the table below. The non-agricultural figures refer to male workers only

He also quotes a number of isolated data reduced to index numbers based on 1892, showing separately men and women and Paris and the rest of France. Where separate data are available, men and women are weighted respectively 2 and 1, Paris and the

rest of France 1 and 4. For such years as they are available, these data are summarised in the next column of the table.

Next Simiand quotes a series calculated by the American Department of Labour, for the period from 1870 to 1903, of average male wages throughout France. Finally, from 1892 onwards, data are available from the " Conseils de Prud'hommes ". These have been weighted in the same proportions.

Years	Agricultural Wages	Non-agricultural Wages	Weighted Average	Isolated Data	American Department of Labour	" Conseils de Prud'-hommes "	General Average	Cost of Living, 1911 Base	Real Wage
1851	68	54	64	..	..	..	64	72·9	73·9
1859–60	..	..	.	61	..	..	..	..	..
1861	89	68	80	..	..	..	80	91·5	73 5
1866	..	72	..	..	.	..	..	..	.
1872	..	80	..	84	85	..	..	..	..
1876	..	84	..	..	90	..	.	..	.
1870–79	..	..	..	..	87·4	..	(94)	100·5	78·8
1881	106	96	101	96	96	..	101	104·0	..
1886	..	98	..	97·5	97	..	..	..	.
1881–7	..	..	..	96·6	96·4	..	.	..	.
1880–89	..	..	..	..	96·6	..	(99)	96·1	86·5
1891	100	100	100	..	99	..	100	89·2	..
1892	..	..	..	..	100	100	.	87	..
1890–99	..	..	..	..	101·3	..	101	87·5	97·2
1896	102	102	102	..	102	102	102	86·3	..
1901	105	106	106	..	104	113	106	89·1	100
1906	109	112	111	.		113	111	94·8	98·5
1911	120	118	119	..	..	120	119	100	100
1921	450	475	468	..	..	462	468	410	96·0

Supporting evidence on national income can also be obtained from statistics of agricultural and industrial output collected in official Enquêtes at various dates. De Foville, using these figures, made exact calculations, for the years 1852 and 1882 only, of the final output of agriculture (value of goods sold or consumed by cultivators, less seed and fodder) of 8·06 milliards for 1852 and 13·46 milliards for 1882. Simiand makes an estimate of 1200 million francs only as the corresponding figure for 1789 For other years we have data of the value of crops and meat sold, but not for other livestock products, or for the deductions necessary for fodder consumption. The other data are, therefore, approximate.

AGRICULTURAL OUTPUT
(Milliard francs)

1789	1·20	1892	13·6
1852	8·06	1912	21·6
1882	13·46		

Coste (*loc cit.*) calculated, for 1882, that the deduction necessary for industrial materials consumed by agriculture in the course of producing this output (implements, fertilisers, etc) was only 4 per cent.

In the introduction to the Enquête Industrielle of 1930 M. Dugé de Bernonville gives a most succinct and interesting summary of the results of previous inquiries. Net output is here defined as gross production less cost of materials and fuel.

Year		Gross Output	Net Output, million francs
1788		931	510 approx.
1812		1820	900
1840–45	(Factories employing 10 or more)	4167	1240
1840–45	Estimate for all factories	..	1550
1861–65		9756	3430

It may be noted that in Coste's estimate (which, though dated 1890, in fact is based on the results of the Enquête Agricole of 1882 and the Population Census of 1886, and therefore refers on the average to a period some years earlier) agricultural net incomes were taken at 10·3 milliards, as against De Foville's estimate of 13·5 milliards of output. It appears that Coste has excluded 3·2 milliards of produce consumed by peasants and their families, and it may be assumed that in the definition of national income used by the other writers this amount is also excluded. Additions on this account are necessary, and are roughly estimated on the basis of changes in rural population, consumption of agricultural products per head, and prices.

Of the various discrepant series included in the previous table, Neumann-Spallart's have at least the merit of having been prepared by a single author, and probably were to some extent reckoned on a comparable basis. They should, therefore, be given more consideration than the others.

Combining all the available information, the following summary of results may be made :

	Year	(Milliard francs) National Income	(Milliard francs) Do, incl Indirect Taxation
No conclusions to be drawn from these figures	1789	2·5	2·8
	1800–1812	6	6·4
	1830	8·5	9·2
	1840–49	9·5	10·3
	1850–59	15·5	16·6
	1860–69	20	21·4
	1870–79	25	26·9
	1880–89	25·7	28·0
	1890–99	27	29·5
	1900–1909	33	35·5
	1911	36	38·5

Though not a direct ascertainment of the national income, we can obtain an invaluable check from De Foville's estimates (in *La France Économique*) of the average annual income of a rural worker and his family. This writer's reputation as a very careful and critical statistician makes the results the more valuable. His figures were :

	Francs per year		Francs per year
1700	180	1852	550
1788	200	1862	720
1813	400	1872	800
1840	500		

These estimates confirm what would otherwise have appeared improbable, namely, the doubling of the average cash income per head between 1788 and 1813. Making comparisons for the later years, we must bear in mind that population was increasing comparatively slowly, from 27 millions in 1800 to 38 millions in 1880, and it will be seen that, as might be expected, the income of the rural worker represents a steadily diminishing proportion of the average national income per head as ascertained from the previous table — a sign of the gradual industrialisation of the country.

Price data by means of which money incomes can be reduced to real incomes are as scattered and incomplete as the national income data themselves. For the earlier years undoubtedly the most useful are those compiled by De Foville (*loc. cit.*) for the cost of living of an average family at prices of 1785, 1810 and 1887. His table covers the prices of food, fuel, clothing, rent and taxes, and miscellaneous. Simiand quotes Hanauer's series of price indexes for agricultural products for the years 1801 to 1875, with a few data for earlier years,

and also some scattered data of prices of industrial products which can be combined into a geometric index. Simiand also calculated himself, from original data, a new index of retail food prices in Paris for each year from 1804 to 1911 inclusive, which he published in diagram form. Finally, we have annual index numbers of the average prices of imports and exports for 1827 and each year from 1847 to 1898 (De Foville, *Économiste français*, 1879, continued by Flux, *Journal of the Royal Statistical Society*, 1900).

Of the retail price index numbers continued up to the present time there is one commencing in the year 1914 and another, on a much wider basis, commencing in 1930. The former refers to Paris only, which may be unrepresentative; and another drawback is that its starting-point is in 1914, while the other index numbers finish before that date. The most satisfactory procedure is, therefore, to use the modern French index number starting in 1930, and to link it backwards to the old series by use of another series which is in effect an all-embracing index number of the cost of living, including services — namely, the officially ascertained averages, for all parts of France, of the "Prix de pension pour ouvrier célibataire". This is available quinquennially from 1896 to 1921, and annually from 1924 (Simiand).

Wholesale price index numbers of industrial goods have been calculated by the Statistique Générale since 1900, and some data for the earlier years have been collected by Simiand, as mentioned above. Since 1926 they have been subdivided and separate sections given for prices of metals and minerals, textiles, etc.

In constructing a general price index number applicable to the national income data, it is clear that some weight should be given to the price of investment goods. For this purpose wholesale prices of metals and minerals are used since 1913, before 1913 wholesale prices of manufactured goods. In the earlier years of the nineteenth century the prices of manufactured goods must be given an increased weight to compensate for the omission of fuel, clothing, etc., from the index numbers of the cost of living.

Pupin computed that 12½ per cent of the national income of France in 1911 was invested: to allow for the production of replacement goods, the weight given to "investment" in the general index should, therefore, be at least one-fifth.

The procedure is therefore as follows: Starting from the year 1911 as base, we give a weight of four-fifths to consumption prices, represented up to 1930 by "Prix de pension" and from 1930 by the new cost-of-living index, and a weight of one-fifth to investment goods, as represented by the wholesale price of metals and minerals. Similar calculations can be made for the two decades 1900–1909

and 1890–99, using the "Prix de pension" data interpolated by Simiand's new index, and using the general index of wholesale prices of manufactured goods. From 1911 back to the beginning of the nineteenth century we have the Simiand series for food prices and certain data collected by Cauderlier and others for rents. De Foville gives the following as a weighting for 1887:

	Francs per Family per annum	At 1810 Prices
Food . . .	520	400
Rent . . .	70	40
All other consumption . .	160	210
	750	650

The other data available for food and rents exactly confirm these ratios between 1887 and 1810 prices.

We thus have a full series of data for food and rents, representing 80 per cent of working-class consumption. For the community as a whole the proportion will be somewhat lower. The remainder of consumption, and all investment goods, must be represented by the prices of industrial products (when available) or by imports and exports.

	I	II	III	IV	V	VI	VII	
	Food Prices (De Foville and Simiand)	Rents (De Foville and Others)	All Other Consumption (De Foville)	Prices of Manufactures (Simiand and Stat Gen.)	Import and Export Prices	All Consumption)*	Investment	Total
Weights, 1880–89	52	8	20	(Weights derived from cols II and III)		80	20	100
				Series based 1901–10	Series based 1880–89			
Years								
1789	32 1	2 8	25 0	244	.	59 9	36 2	96 1
1810	36 7	4 5	26 2	.	..	67 4	(36)	103 4
1800–12	36 2	4 5	(26)	.	.	66 7	(36)	102 7
1830	48 4	4 6	..	..	126	..	.	103 5
					(1827)			
1840–49	43 3	4 7	.	172	116	.		96 8
1850–59	46 6	4 7	..	.	139	.	.	106 8
1860–69	47 5	6 7	..	168	136	..	.	106 2
1870–79	54 5	7 3	.	.	117	..		108 6
1880–89	52 0	8 0	20 0	(135)	100	80 0	20 0	100 0
1890–99		..	.	.	86	71 7	12 2	88 9
1900–09	.	..	..	100	.	74 9	14 8	89 7
1911	54 1	9 4	..	115	.	80 2	16 7	96 9
				(1913)				
1930		..		618	..	620 0	91 8	711 0
1925–34	.	..	..	552		537 0	82 0	619 0
1934	.	.		437	..	517 0	65 0	582 0

* "Prix de pension" and cost of living from 1890.

Figures of the numbers of occupied population are in even greater confusion than figures of incomes and prices, in spite of Simiand's heroic attempts to extract order out of the chaos of the Census returns (see p. 190 below). The worst sources of confusion are females engaged in agriculture, who were recorded at various censuses on different bases, and domestics, who were in some censuses not recorded at all. Simiand has been able to prepare a continuous series back to 1852 of the number of males engaged in industry and commerce, but these figures are of little help, as a very varying proportion of females were employed In the following table a definition of occupied population is adopted exclusive of women engaged in agriculture and inclusive of domestics and soldiers. Prior to 1876 it is estimated simply on the basis of population changes.

Years	Occupied Population, millions	National Income (including Indirect Taxes), milliard francs	National Income at 1925–34 Prices, milliard francs	Income per Occupied Person at 1925–34 Prices, francs
1850–59	14·25	16·6	96·2	6,760
1860–69	15·0	21·4	124·6	8,300
1870–79*	14·5	26·9	153·4	10,580
1880–89	15·2	28·0	173·4	11,420
1890–99	15·8	29·5	205·4	13,000
1900–1909	17·0	35·5	245	14,420
1911	17·69	38·5	246	13,910
1930	18·24	270	235	12,880
1925–34	18·24	224	224	12,290
1934	19·0	203	216	11,380

* Alsace and Lorraine excluded from figures 1871–1918.

Annual figures from 1920 to 1934 have been calculated by M. Dugé de Bernonville.[1] His results are expressed per head of the population and must be re-expressed as figures per head of the occupied population (excluding women engaged in agriculture). These figures are obtained from the quinquennial census and were 17·95 in 1921, 18·0 in 1926 and 18·42 in 1931. The results of the 1936 Census are not yet available, but population in the aggregate shows no change and it is assumed that the working population has also remained constant.

Price indexes are calculated as before, the most representative

[1] *Revue d'Économie politique*, May–June 1935. Figures for 1937 quoted by M. Reynaud in statement published by *Economist*, November 19, 1938 M. Reynaud's figures were in gold francs and were reconverted at the average rate current for the year 1937.

figure of consumption prices being taken as the index of "Prix de pension pour ouvrier célibataire", which index covers food, fuel, rent and service. This index is interpolated, for the years where it is not available, by the index of cost of living. From 1926 onwards an index of investment goods prices is also available.

Figures regarding hours of work between 1892 and 1930 can be calculated from the returns of the "Conseils de Prud'hommes".[1] By showing both hourly and daily averages of wages, these returns make possible a calculation of the average number of hours per day. Returns are given separately for Paris and the rest of France (weighted 4 and 1 respectively) and for men and women (weighted 2 and 1 respectively).

Since 1930 average hours can be calculated from the returns of the labour inspectors.[2]

AVERAGE HOURS PER DAY CALCULATED FROM RETURNS OF "CONSEILS DE PRUD'HOMMES"

Year	Paris		Rest of France	
	Males	Females	Males	Females
1896	9·5	10	10·4	10·2
1901	9·77	10·5	10·3	10·3
1906	9·5	10·55	9·95	9·94
1911	9·75	11·75	10·05	9·95
1916	10·6	13·2	9·76	9·47
1921	8·65	9·92	8·21	8·06
1924	8·47	..	8·41	8·22
1925	8·65	..	8·35	8·10
1926	8·75	..	8·38	8·20
1927	9·05	..	8·28	8·32
1928	8·75	..	8·25	8·15
1929	8·74	..	8·21	8·11
1930	8·75	..	8·24	8·19

The *Economic Journal* in 1913 [3] prepared some notes on changes of hours from 1848 to 1900. For 1848 they gave the average working hours as 12 per day, or 72 per week, falling to 11 by 1900. Jeans in *England's Supremacy*, published in 1884, gave 66 hours as the working week in French industrial establishments at that date.

The following figures are taken for the average length of the working day:

[1] Quoted by Simiand, vol. iii.

[2] Quoted in *I.L.O. Year Book.*

[3] Page 152.

Up to 1879	12·0	1925	8 31
1880–89	11·0	1926	8 37
1890–99	10·2	1927	8·39
1900–1909	10 1	1928	8·28
1911	10·1	1929	8·25
1920	8·4	1930	8 29
1921	8·34	1931	7 94
1922	8·35	1932	7 55
1923	8·35	1933	7 86
1924	8·36	1934	7·71

Canada

Average real income, measured at 1925–34 prices, per occupied person, measured in international units, was :

1903	1317
1911	1182
1925–34	1380

These results are unexpected, particularly the decline in average real income per head during the period of apparently very rapid economic expansion between 1901 and 1911. When we come to look for it, however, we find confirmatory evidence. Statistics of wages (also taken from the 1915 Coats report) show that average money wages between 1903 and 1911 rose 25·5 per cent. This was only fractionally less than the rise in the cost of living, and real wages rose by less than 1 per cent. Figures are also quoted in the report showing the salaries of ministers of religion and school teachers in 1912–13 as compared with 1900, and it appears that their standard of living was actually declining.

Exactly the same conclusion can be reached from an examination of output statistics.

For national income in the year 1911 an estimate of $2000 millions was made by R. H. Coats.[1] The earlier estimate for the year 1903 was made by Sir Robert Giffen.[2] In the course of a survey of national incomes throughout the British Empire he quotes for

[1] Quoted by Harvy Fisk, *Dominion of Canada*, New York, 1927. Findlay Shirras, (*J.R.S.S.*, 1925, p. 543) gives a still lower figure of $1500 m. for 1913.

[2] *Journal of the Royal Statistical Society*, 1903, p. 584.

Canada a figure of £270 millions. It is assumed that the figure is intended to refer to the current year. Probably it only represents an approximate estimate, but Giffen's authority is adequate.

Addition of customs revenue and other small items of indirect taxation gives us figures of $1370 millions for 1903 and $2100 millions for 1911.

Changes in the cost of living in Canada during this period are obtained from the famous encyclopaedic inquiry carried out in Canada in 1914–15 by Dr. Coats and others [1]

The retail cost of food and fuel, weighted according to family budgets, is given for the years 1900 to 1913, together with some isolated data about the cost of clothing. It is also necessary to link these price figures to post-war data. Post-war figures are related to the level of retail prices prevailing in mid-1914, which must be assumed to have been the same in 1913. Taking the year 1913 as 100, we have:

	1900	1905	1911	1925–34
Food and Fuel .	72·4	76·5	95·2	140
Clothing . .	77·0	86·5	.	..
TOTAL	74	80	96 (estimated)	140

We may estimate a figure of 76·5 for the year 1903. Statistics of the occupied population in 1901 and 1911 are given in the same report. During these ten years, recorded population rose from 1,799,000 to 2,724,000. We may assume a figure of 1,970,000 for 1903.

Dr Cudmore in *The National Income of Canada* computes national income for 1930 by three different methods:

Production method	$5016 m.
Consumption method (from census of retail sales and other services)	$5100 m.
Incomes received method	$4952 m.

For other years we have an index number computed in *Monthly Review of Business Statistics* (Supplement, January 1938) on a 1926 base as follows:

1919 . . .	96 6	1923 . . .	83·8
1920 . . .	102·9	1924 . . .	82·9
1921 . . .	77·3	1925 . . .	91·3
1922 . . .	78·0	1926 . . .	100·0

[1] *Report of Board of Inquiry into Cost of Living in Canada*, 2 vols., 1915.

1927	107·2	1932	57·8
1928	113·2	1933	54·8
1929	108·4	1934	65·4
1930	91·6	1935	70·3
1931	70·7	1936	77·6

It appears that these have been constructed on the assumption that the value of the output of services moves proportionately to the value of output of material production, which makes the data of little value for detailed analysis.

In view of the relatively large fraction of the national income represented by imports and exports, it is desirable to re-value these separately in revealing the Canadian national income to a fixed price basis. The figures below refer to "income available" rather than "income produced", i.e. after deducting some $200 millions per annum payable as external interest and dividends.

In *Report on Prices* Dr. Coats quotes available figures showing changes in gross production between 1900 and 1910. These may be compared with the statistics of occupied population in 1901 and 1911. The most convenient way of measuring changes in general productivity is to calculate the number of occupied persons who would have been required in 1911 to produce the output of that year if the 1901 ratio of output per head had been maintained, and then to compare these returns with the number actually found to be required.

	Percentage Increase in Production, 1900–1910	Numbers Occupied in 1901, thousands	Numbers required to produce 1911 Output at 1901 Rate of Output per Head, thousands	Numbers Actually Occupied in 1911, thousands
Agriculture	Plus 37	717	982	934
Fishing	,, 2	27	27	35
Lumbering	,, 54	40	61	122
Manufacture	,, 100	246	492	384
Mining	,, 64	37	61	64
Transport	,, 150	87	217	246
	..	1154	1840	1785

No output measures are available for building and contracting, public, domestic and personal service, trade and commerce, but it will be seen that there was an improvement of only 3 per cent of gross physical output per occupied person, while there was a considerable increase in the burden of interest payable abroad.

Year	Current Value of Available National Income,* $ million	Consumption and Investment in Canada, *i.e.* National Income less Balance of Payments, $ million	Do., at 1930 Prices revalued by Cost of Living Index Number, $ million	Volume of Exports at 1930 Prices,† $ million	Volume of Imports and Net Invisible Imports at 1930 Prices,† $ million	Real National Income at 1930 Prices,‡ $ million	Do., I U., million	Occupied Population,§ thousands	Real Income per Head, I U.	
									Current Working Hours	48-hour Week
1920	5610	5966	4770	580	775	4575	4821	3070	1570	1409
1921	4215	4448	4020	531	640	3911	4121	3170	1301	1168
1922	4250	4329	4300	740	751	4289	4519	3235	1398	1254
1923	4570	4652	4620	866	793	4693	4945	3280	1510	1354
1924	4520	4452	4500	815	747	4568	4814	3345	1440	1291
1925	4980	4752	4750	957	860	4847	5107	3420	1495	1342
1926	5450	5315	5280	935	1018	5197	5476	3485	1572	1410
1927	5850	5806	5850	948	1103	5695	6000	3575	1680	1521
1928	6175	6128	6150	1126	1302	5974	6295	3665	1719	1587
1929	5910	6174	6130	913	1310	5733	6041	3765	1605	1496
1930	5000	5282	5282	800	1082	5000	5268	3845	1371	1296
1931	3860	4037	4450	699	779	4370	4605	3925	1171	1124
1932	3150	3245	3940	627	578	3989	4203	3995	1054	1028
1933	2990	3058	3910	672	495	4087	4306	4070	1057	1049
1934	3570	3605	4540	751	606	4685	4937	4130	1197	1208
1935	3835	3771	4720	810	637	4893	5156	4200	1229	1260
1936	4230	4037	4940	996	716	5220	5501	4250	1297	1352

* Deduced from series of index numbers quoted above

† From index numbers computed by Dominion Bureau of Statistics, equated to 1930 value of exports and of imports plus net invisible imports.

‡ Value of consumption and investment in Canada + volume of exports − value of imports

§ In 1921 36 1 per cent of population were occupied and in 1931 37 8 per cent. This ratio is presumed to have a linear trend.

Increasing productivity in manufacture and a slight increase in agriculture were, as it was seen, largely neutralised by diminishing returns in lumber, owing to the using up of the more easily available forests and diminishing productivity of labour in transportation.

Between 1913 and the decade 1925–34, the average real wages per hour showed a rise of 31 per cent.[1] No accurate statistics are available about the average hours worked, but there appears to have been a reduction of 15 to 20 per cent since pre-war days. This leaves a figure of 15 per cent or less as representing the increase in the average annual real wages of those in employment, as against a 16 per cent increase, between 1911 and 1925–34, as calculated for real income per head. The wage-earner's gain from shorter hours about counterbalances his loss through unemployment.

Japan

Full information about Japan's national income is only available for recent years, but partial inquiries can be made carrying the figures back to 1887. Estimates of Japanese national income running back to the year 1887 were prepared by Mori for the Tokyo session of the International Institute of Statistics in 1930. It is quite impossible, however, to reconcile these figures with other sources of information, particularly statistics of agricultural production. It appears that Mori was working on a limited definition of national income not applicable for comparison with other figures.

The most valuable source of information for the earlier years is to be found in direct examination of statistics of agricultural production, for which we are indebted to Dr. Penrose.[2] His method is to recalculate the output of various products at prices prevailing in a base period, in this case the average of the five years 1921–25. It is possible to obtain figures of the value, at these prices, of all agricultural and fishery output for the years from 1909 onwards, with the exception of curious gaps in the years 1915, 1916, 1918, 1919 and 1921.

For earlier years it is possible to obtain a valuation of the output of cereals and fishery products Livestock products are of comparatively small importance in Japanese production, and the above therefore provide a fairly good indication.

Extracts from Penrose's figures are made for comparison with available statistics showing the numbers of the occupied population and the industrial distribution. These figures, prepared by Professor

[1] *I.L.R.*, vol. 20, p. 121, for figures up to 1928; for subsequent figures, current issues.

[2] International Institute of Statistics, Tokyo Session, 1930, 2nd vol. p. 240.

Hijkata,[1] are available at five-yearly intervals, going back as far as 1872. This table was prepared before the results of the 1930 Census of Japan were available, and the more recent figures require adjustment.

Year	Assumed Average Hours	Average Income per Head in International Units	Do., on 48-hour Week Basis
1887	72·5	107	72
1897	72·5	108	72
1908	70·5	145	99
1914	62·8	172	132
1915	62·4	138	106
1916	62·1	151	117
1917	61·8	176	137
1918	61·4	214	167
1919	61·1	235	185
1920	60·8	193	153
1921	60·5	214	170
1922	60·1	229	183
1923	59·8	254	204
1924	59·5	284	229
1925	59·1	305	248
1926	58·8	343	280
1927	58·1	337	278
1928	58·1	355	293
1929	57·4	337	282
1930	55·7	343	295
1931	55·1	371	323
1932	55·6	370	319
1933	57·0	386	325
1934	57·3	408	342
1935	57·4	412	345
1936	57·7	406	337
1937	58·3	..	..

Hijkata's figures of the numbers employed in agriculture include a considerable number of female members of farm families, whom, for the sake of international comparison, we wish to exclude, and figures must be amended accordingly. To reduce the effect of chance fluctuations due to crop variability, Penrose takes the average agricultural output for the three years centring on the date for which a comparison is to be made. The series can be linked to the official post-war data in the year 1925, in which year a census of the value of agricultural output was taken.

[1] Quoted in *I.L.R.*, 1930, 2nd vol. p. 504.

OUTPUT IN MILLION YEN AT 1921–25 PRICES

Year	Cereals and Fish	All Agriculture and Fishing
1896	1720	2280*
1897	1638	2170*
1898	2136	2830*
1901	2114	2880*
1902	1979	2620*
1903	1955	2590*
1906	2145	2845*
1907	2260	3000*
1908	2380	3155*
1911	2565	3393
1912	2256	3421
1913	2578	3472
1914	..	3664
1925	..	4403

* Estimated from previous column.

In his recent calculations [1] of national income Professor Hijkata gives 3269 million yen as net income produced by agriculture and fishing in 1925 Yen prices in 1925 did not differ significantly from the average over the period 1921–25. The gross output of agricultural products in 1925 quoted by the Mitsubishi Bureau in *Japanese Trade and Industry* was 4484 million yen. A direct pre-war estimation of the value of output of Japanese agriculture (quoted by Penrose) was made for the period 1905–7.[2] The figure was £126 millions, which can be recalculated at 1060 million yen at 1900 prices, or 2955 million yen at 1921–25 prices. Output in the same three years, estimated by Penrose's index, taking gross output in 1925 as the base, was 2740 million yen. There appears to be some indication that Penrose's figures understate the amount of output in the earlier years, but the data are not precise enough to reach any exact conclusions. The ratio of net income to gross appears to have been considerably higher in the earlier years, as might have been expected. Professor Hijkata's figure for net income from agriculture and fishing in 1914, revalued at 1921–25 prices, is 3250 million yen, or about 80 per cent of the gross output as recorded by him. (His basis of recording gross output is

[1] *Mitsubishi Economic Research Bureau Monthly Circular*, March 1934.

[2] Quoted by Sale, *Journal of the Royal Statistical Society*, 1910–11, p. 480.

higher than Penrose's.) This figure will be used as a basis for estimates of agricultural net output in the years before 1914, Penrose's index number being used to carry the figures back. Agriculture contributed about half of the real national income in Japan in 1914, but less than 30 per cent in 1925. During the intervening period there had been a very great increase in productivity of the non-agricultural portion of the community. We have no precise measures of their productivity

POPULATION AND NATIONAL INCOME AT 1925 PRICES

	1887	1897	1908	1914	1925
Occupied Population, millions :					
Agriculture and Fishing, excluding women	9·3	9·5	9·1	8·6	8·2
Other	5·2	7·3	9·7	11·3	13·3
TOTAL	14·5	16·8	18·8	19·9	21·5
Net income per head of non-agricultural population (estimated from real wages prior to 1913), yen	205	200	270	284	682
Net income per head in agriculture	200 ?	205	274	378	399
Income, million yen (at 1925 prices) :					
Agriculture and Fishing	1860	1950	2490	3250	3,269
Other	1065	1460	2620	3210	9,085
TOTAL	2925	3410	5110	6460	12,354
TOTAL income per head of occupied population, yen	202	203	272	324	575

in the years before 1914, but some indication can be obtained from the course of real wages. At any rate the figures of real wages can provide us with a minimum indication of the rate of growth of productivity. If, as is probable, the proportion of wages to national income decreased with increasing productivity, we must conclude that the advance in productivity was even more rapid than indicated by the following figures.

Statistics of real wages in pre-war years are given by Professor G. C. Allen [1] and by Sale.[2] The latter gives calculations, based on

[1] *Economica*, 1926, p. 173.

[2] *Journal of the Royal Statistical Society*, 1910–11, p. 480.

wages and wholesale prices, for 1887, 1897 and 1908. Professor Allen's series starts in 1900, and is continued to 1920. Professor Allen's figures for 1912 to 1915 are taken as equivalent to 1914 We find that real wages rose 40 per cent between 1897 and 1914, but that there was no appreciable change between 1887 and 1897.

From 1914 estimates of Japanese national income have been prepared, on a basis and definitions similar to those used in Europe and America, by Professor Hijkata of Tokyo Imperial University. Hijkata's results for 1914 to 1931 were published in the Mitsubishi Economic Research Bureau's *Circular* for March 1934, and up to 1933 in the April 1937 issue. Estimates for 1934, 1935 and 1936 have been made by the Bureau, on the basis of an index number of commodity prices, railway traffics and bank clearings. Though the movements in this index agree fairly closely with national income movements in past years, it cannot be said to provide a very wide basis for extrapolation.

The following are the ascertained results :

	Million yen		Million yen
1914	2,659	1929	11,919
1925	12,354	1930	10,471
1926	12,049	1931	10,043
1927	12,040	1932	10,229
1928	12,424	1933	11,469

Shiomi (*Kyoto Economic Review*, 1934) makes an independent estimate for 1930 of 10,636 million yen, which is in close agreement. Mori (International Institute of Statistics, Tokyo Session, 1930) prepared an estimate of national income for 1925 of 13,382 million yen and gives a series of figures purporting to show national income since 1887. Shiomi (*loc. cit.*) makes considerable criticisms of Mori's work, and it has been pointed out above that it seems to be difficult to reconcile Mori's figures with other sources of information.

The Mitsubishi estimates are :

	Million yen
1934	12,030
1935	12,480
1936	13,110

It is possible to check the 1934 figure independently. For various reasons 1934 is the best year on which to base an international comparison, and for that reason a check is desirable.

Professor Hijkata compiles his estimate by the net output method, and the principal items in his total can be brought up to date by means

of production statistics. The increase in income from transport is estimated on the basis of the rise in railway revenues.

	Income, in million yen		
	1925	1931	1934
Agriculture and Forestry	3,362	1,200	1470
Fishing	209	129	200
Mining	193	109	200
Manufacture	2,812	2,161	3650
Transport and Communication	611	674	770
Government	1,104	1,317	1970
Other	4,063	4,453	..
TOTAL	12,354	10,043	..

The other sources of income are mainly commerce, the professions and domestic service. If we reckon them at 4700 million yen in 1934 — they had shown a strong upward tendency in the previous decade — we obtain a total of 12,960 million yen, or nearly a milliard higher than the Mitsubishi estimate. It may be pointed out that the estimates for 1932 and 1933 prepared by the Mitsubishi method turned out in fact to be too low by 416 and 458 million yen respectively. We can conclude that national income in 1934 was probably 12,500 million yen.

The average income for the period 1925–34 is 11,550 million yen. For Japan there are no price data by means of which an international price comparison can be made similar to that between other countries, although scattered data are available. There is a more serious difficulty. A large part of the Japanese national income represents foodstuffs consumed by the peasants themselves and not subject to sale at all.

The method therefore adopted is as follows: Statistics are available showing the consumption per head in Japan of all the principal foodstuffs. These quantities are re-valued direct at British retail prices for 1934 For this year comparison can be made with the calculations of quantity and retail value of food consumption in Britain made by Sir John Orr in *Food, Health and Income.*

The remainder of the Japanese national income is re-valued at British prices by the use of certain data on Japanese prices of industrial goods.

The following table gives the food comparison. For rice and

wheat, the average consumption of 1933–35 is taken. The Japanese statistics of rice consumption are given in *koku*, equivalent to 4·96 English bushels, and appear to refer to the volume of polished rice. A *koku* of rice is therefore, taken as 382 lb. of wheat, 297 lb. A deduction is made for the amount of rice (230 million lb.) estimated to be used in brewing *saké*, of which the output is 150 million gallons. In the case of fruit and vegetables, an estimate can only be based on the acreage grown, which is 2·3 million acres in Japan as against 1·3 million acres in England and Wales, or 7 per cent more per head. This is in accord with what is known of the Japanese dietary. In the case of fish, the coastal pelagic and trawling outputs are added together, together with the fish caught by Japanese fishermen on the coasts of the Japanese dependencies, the output of the floating canneries (other than exports) and half the weight of crustacea caught (shrimps, cuttle-fish, etc). Deduction is made for exports of fresh fish, and half the weight of fish-meal exports. Careful examination of the fishery statistics is necessary, as fish constitutes the most important element in the Japanese diet.

CONSUMPTION PER HEAD OF POPULATION

	Britain 1934, oz per week	Japan 1934, oz per week.	Japanese Consumption at British Prices, pence per week
Rice	1·8	129·0	16·9
Wheat (as bread)	82·6	16·1	1·8
Meat and poultry	44·0	1·7	1·1
Fish	13·2	29·5	11·4
Eggs (number)	2·9	1·0	1·4
Milk (pint)	2·8	0·12	0·4
Butter and cheese	11·5	0·2	0·2
Sugar and honey	27·7	2·6	0·4
Tea	4·0	0·3	0·4
Fruit and vegetables (pence)	19·2	..	20·6
	..	..	54·6

giving a total of 54·6d. per week as against the British total of 105·7d. For purposes of comparison about 2d. should be deducted from the Japanese figure on the grounds that rice is priced slightly higher than wheat in Britain, while their food values are about the same. The Japanese diet is clearly adequate in calories and probably not adequate in animal protein. It is probably deficient in minerals and is deplorably deficient in fats.

The poorest, 10-15 per cent of the British population, spend only 48d. per head per week on food, and appear to be worse fed than the average Japanese. They consume 23·1 oz. of meat and 2·7 oz. of fish, but only 6·4d. worth of fruit and vegetables. This poorest section of the British population, however, consumes 10·2 oz. of butter, margarine and other fats, and 13·5 oz. of sugar.

The food consumption of the Japanese population in 1934 may therefore be revalued at £11·41 per head per annum, or £780 millions at British retail prices. Assuming food consumption per head to be the same in the towns as in the country, the non-agricultural population of 38 millions consumed food worth (at retail prices) 81·3 yen per head per annum, or 3·1 milliards in all.

We must now enumerate the value in yen and sterling of the non-food part of the Japanese national income.

Direct comparison between factory prices in Japan and Britain can be made in respect of a number of products. The Japanese data are taken from *Kojo Tokeihyo*, or Factory Statistics (published in Japanese) for 1933, the British from Census of Production and Import Duties Act Inquiry. The Japanese prices are in the first instance reduced to British throughout on the basis of 1 yen = 1·87 shillings (average value 1924–30).

	Japan, 1933	Britain, 1933
Textiles :		
Coarse cotton, pence per yd.	3·12	3·69
Velvet ,, ,,	7·1	9·4
Crepe silk ,, ,,	13·8	53·5
Crepe silk rayon ,, ,,	9·0	13·8
Flannel ,, ,,	22·3	17·6
Linen piece goods, pence per sq. yd.	19·9	9·5
Knit goods :		
Cotton stockings and socks, s. per doz.	2·61	6·52
Silk stockings, s. per doz.	15·9	23·5

In general, certain Japanese prices, particularly silk and cotton prices, are below English, while others are higher. The geometric average for textile prices for 1933 shows English prices 25 per cent higher than Japanese at the rate of exchange quoted, i.e. the purchasing power of £1 in 1933 was equal to that of 8·6 yen. For hosiery, the purchasing power of £1 was equivalent to that of 5·5 yen only.

We have no information about retail prices in Japan, and must assume that these wholesale prices are indicative of the purchasing power of money. The difference between factory and retail prices largely consists of labour costs, and may be lower in Japan than elsewhere. It may be concluded, therefore, that the purchasing power of the yen, in comparison with English prices, may be even higher than is indicated by the above figures, and is unlikely to be lower.

A number of other direct price comparisons are possible from data given in *Japanese Trade and Industry*. Cement (export price) was 14·9 yen per ton in 1937, as against a British price of £1·27. Bicycles were produced at 20 yen each as against an average British price of £3·4 at works. Shipbuilding costs per ton for a 7000-ton steamer were 150 yen as against about £9 in England. For the nine principal chemical products we have the following comparison (for 1933):

	Japanese Price, yen per metric ton	British Price, £ per British ton
Sulphuric acid . .	19·2	3·49
Hydrochloric acid .	35·9	3·18
Nitric acid . .	127·6	16·3
Soda ash . . .	98·8	5·57
Caustic soda . .	167·3	10·91
Bleaching powder .	79·3	4·99
Acetic acid . .	444	35·4
Glycerine . . .	690	34·8
Magnesium carbonate .	234	15·0

The purchasing power of the yen is not so high here. Taking a geometric mean from the above data, the yen's purchasing power averages 12·8 to the £1.

The yen has a very high purchasing power, however, in the case of fuel. To an industrial buyer, according to the Mitsubishi Bureau (*loc. cit.* p. 345), electricity only costs 2 sen per kilowatt-hour and gas 30 sen per 1000 cubic feet. The corresponding price of electricity in Britain (for industrial users) is 0·78d., and of gas 40d. for general consumers, or, say, 30d. for industrial consumers. It is possible that the Japanese gas is of lower calorific value, but on the basis of the electricity figure we can say that the yen has a purchasing power of 39d., in the case of gas a good deal higher.

We may therefore summarise our results, referring to 1933 or 1934:

	Purchasing Power, yen to £1
Textiles	8·6
Hosiery	5·5
Chemicals	12·8
Bicycles	5·9
Ships	14·0
Cement	11·7
Fuel	5·0

We can weight these approximately from national income data. The national income in 1934 was approximately 12·5 milliard yen, from which we can separate in the first place 1·8 milliards of public services paid for through taxation. Of the remainder, 2·4 milliards were invested and 8·3 milliards consumed, food sales representing about 3·3 milliards of the latter. We may take cement and ships as indicative of investment goods prices, with a weight of 2·4 units, and the others as representative of consumption good prices with a weight of 5 units between them. We can, therefore, revalue as follows :

	Weights in yen	Equivalent in £
Fuel	1	·200
Textiles	2	·232
Hosiery	1	·182
Ships	2	·143
Cement	2	·171
Bicycles	2	·339
Chemicals	2	·156
TOTAL	12	1·423

In general, we may say that in goods other than food the yen has a purchasing power of £0·1186, or 28·5d. (8·4 yen to £1), while the rate of exchange actually current in 1934 was only 14·1d. In the case of foodstuffs, however, the purchasing power of the yen was as high as 52d. When the Japanese national income is to be re-valued in sterling it appears that non-agricultural incomes, other than savings, may be put at 8·66 milliard yen in 1934. According to the family budget inquiries, about 34 per cent of this would be spent on food at retail values, or 2950 million yen. The whole value at wholesale of food production + imports − exports was 2900 million yen. From the similarity between these two figures we must conclude that the cost of distribution, transport and indirect taxation incorporated in the value of urban retail sales of food must be about equal to the

imputed wholesale value of rural food consumption. Altogether we can conclude that the amount spent on food altogether, at retail prices by the towns (between 2·95 and 3·34 milliards) and at imputed wholesale prices by the countryside (between 1·16 and 1·36) was 4·3 to 4·5 milliard yen.[1] The expenditure on all other goods and services, including investment goods and public services, therefore amounted to 8·1 milliard yen. We have therefore the following revaluation of the Japanese 1934 national income :

	Milliard yen	£ million
Food	4·4	780
Other goods and services .	8·1	959
TOTAL . .	12·5	1739

This corresponds to a total of £1938 millions at British prices averaged over the period 1925–34. For purposes of international comparison we must add the proceeds of local and indirect taxation, which for 1925–34 average 740 million yen per annum, the equivalent of £106 millions on the above basis, or an addition of 6½ per cent. The same proportionate addition is assumed to be valid for individual years.

With regard to hours, the summary of results prepared by Professor Foxwell[2] in 1901 shows that the average number of hours then worked per year, taking holidays into account, was 3770, or 72·5 per week. The number of holidays was just over 50 per year.

Exact current records begin in 1926. The Imperial Cabinet Statistical Office now publishes a figure for the general average of hours per day.[3] Average number of hours per day and of days per month from 1929 to 1937 are given in the *International Labour Review*, April 1939. Average days per month in 1929 were 26·9, or 6·19 per week, and this figure is assumed to be applicable to the period 1926–29. It is assumed that the fall in hours from 1900 to 1926 was fairly regularly spaced.

[1] Food consumption per head of the population at wholesale values, deduced from the above figure of 2·9 milliard yen, will be 42 5 yen per head per year. Comparison of wholesale and retail price statistics for Tokyo, quoted in the *German Statistical Year Book*, indicate that average consumption per head measured at retail prices may be put at 81·3 yen. It thus appears that the town consumption of 2 95 milliard yen at retail values may be put at 1·54 milliard yen wholesale, leaving 1·36 milliard yen at wholesale value for rural food consumption. This gives the rural population 47 per cent of the aggregate food consumption at wholesale values. They number 44 per cent of the whole population and thus apparently have a slightly higher food consumption per head than the urban population. This conclusion does not appear unreasonable.

[2] *Economic Journal*, 1901.

[3] Quoted in *I.L.O. Year Book*.

An article by Mr. Kaya, present Japanese Finance Minister, in *Japan's Finance and Industry* (a booklet published by the Foreign Affairs Association of Japan) quotes the following figures for national income :

	Million yen		Million yen
1904	1,148	1930	10,600
1905	1,233	1934	11,200
1914	2,443	1935	12,300
1920	7,954	1936	13,700
1926	12,500		

The 1914 figure is 8 per cent below that used below, and the 1926, 1930, 1935 and 1936 figures in substantial agreement with those quoted below. According to Professor Allen's figures, prices in 1904–7 were 9·5 per cent below those of 1914. On this basis, aggregate real income rose as much as 85 per cent between 1904–5 and 1914, as against a rise of 9 per cent only in occupied population. The calculation below shows a rise of 90 per cent between 1897 and 1914, and bearing in mind the fact that 1904 and 1905 were war years, it is quite conceivable that aggregate real income in these years was not much greater than in 1897.

What is remarkable is that so great a rise in real income should only be accompanied by a 10 per cent increase in real wages.

For the years between 1914 and 1925 we have Professor Hijkata's direct calculations of national income reduced to standard price level by the retail price index number (not too reliable) :

Year	Occupied Population excluding Females engaged in Agriculture, millions	National Income, million yen (Current Prices)	Do., at 1914 Prices	Real Income per Head, 1914 prices, yen
1914	19·9	2,659	2659	134
1915	20·0	2,553	2165	108
1916	20·1	3,617	2945	122
1917	20·15	5,212	2970	147
1918	20·3	7,659	3715	183
1919	20·5	10,657	4160	203
1920	20·7	9,436	3455	167
1921	20·85	9,982	3850	185
1922	21·0	10,650	4150	198
1923	21·15	10,627	4660	220
1924	21·25	11,496	5220	246
1925	21·45	12,354	5660	264

It will be seen that, although the expansion from 1897 to 1914 was undoubtedly rapid, it was in the eleven years from 1914 to 1925 that the real rapid expansion took place, in spite of the war and the tremendous financial crisis of 1920.

We may now link these to the current figures from 1925 onwards.

By the use of the Japanese cost-of-living index number, we can revalue the income of the other years to the 1934 base :

Year	National Income, million yen	Do, at 1934 Prices, million yen	Do, at British Prices of 1925–34, £ million	Do, in million International Units, including Allowance for Indirect Taxation	Occupied Population	Per Head
1925	12,354	8,430	1171	6560	21·45	306
1926	12,049	9,020	1254	7020	21·65	325
1927	12,040	9,490	1320	7400	21·9	337
1928	12,424	10,070	1400	7840	22·1	355
1929	11,919	9,770	1360	7520	22·3	337
1930	10,471	10,070	1400	7840	22·8	343
1931	10,043	11,010	1529	8570	23·1	371
1932	10,229	11,110	1544	8640	23·35	370
1933	11,469	11,690	1624	9100	23·6	386
1934	12,500	12,500	1739	9740	23 85	408
1935	13,000	12,730	1771	9930	24·1	412
1936	13,600	12,700	1766	9890	24·4	406

New Zealand

The first two columns in the following table refer to the quantity of goods and services produced, while the third column refers to the quantity of goods and services available for consumption or investment in New Zealand (or for accumulation abroad on New Zealand account). This differs from the second column owing to changes in the terms of trade. Foreign trade bears an unusually high ratio to national income in New Zealand, and when the terms of trade are adverse, "real income available" may be low when "real income produced less external obligations" is high. By using the latter method, our final calculation of I.U.

per head will show the effects of changes in productivity and of obligations to external capital, the effects of changes in the terms of trade being eliminated. Similar calculations (of "produced real income plus or minus external income or obligations") are made in the cases of Great Britain, Canada and Australia, which are also

Years	Real Income at 1926–30 Prices per Person in Work			Produced Income less External Obligations, Including Indirect Taxation	I U per Head of Occupied Population	I U. per Person in Work	Do, at 1914 Hours (48 per week approx)
	Produced	Produced less External Obligations	Available				
1901–3	235	207	..	228	866	880	880
Years ending March.							
1925–26	308	296	290	326	1219	1247	1303
1926–27	301	287	283	316	1153	1202	1256
1927–28	319	303	312	333	1213	1265	1227
1928–29	323	305	315	335	1216	1273	1331
1929–30	320	302	299	332	1195	1261	1317
1930–31	301	280	269	308	1086	1170	1223
1931–32	310	285	266	313	1079	1190	1244
1932–33	321	297	276	327	1118	1240	1297
1933–34	374	347	328	382	1320	1448	1513
1934–35	367	344	319	378	1325	1435	1500
1935–36	370	349	339	384	1348	1459	1525
1936–37	397	377	370	415	1459	1571	1726
1937–38	377	360	362	396	1425	1500	1790

countries where the ratio of international trade to national income is high, and changes in the terms of trade are liable to affect the amount of available real income per head. In all other countries the discrepancies will be small and can be neglected, and "available real income only" is calculated.

Sir Timothy Coghlan[1] provides estimates relating to the years 1901–3. The value of income produced was estimated at £38·5 millions, of which £3·3 millions represented interest payable abroad on Government loans and another £1·3 millions interests on private loans and capital. The net income was £33·9 millions, or £37·3 millions including indirect taxation and local rates. The only price

[1] *The Seven Colonies of Australasia.*

index available from 1901 to 1914 is the index for exports. From that date we have cost-of-living figures.

Occupied population excluding women engaged in agriculture was 322,000 in 1901. This gives an average income per head of £112·3 at 1901 prices, £156·2 at 1914 prices, or £228 at 1926–30 prices.

Real income per person in work at 1926–30 prices is quoted from an unpublished memorandum on New Zealand national income prepared by Mr. F. B. Stephens and the present author. Real income in this case has been calculated without making an allowance for indirect taxation, which added 10 per cent to the money national income averaged over the period 1925–34, and 12 per cent in 1936–37 and 1937–38. These additions give figures suitable for comparison with other countries and with the data for 1901–3. It is calculated in the memorandum quoted above that over the period 1925–34 one New Zealand pound had on the average a purchasing power of 4·06 international units. At 1926–30 prices a New Zealand pound had a purchasing power of 3·80 international units. This factor is used to calculate real income per head in international units per person in work in the above table. Figures of occupied population and unemployment quoted in the above source are used to calculate real income per head of occupied population including unemployed, for comparison with other countries. Finally allowance is made for changes in working hours (which between 1925 and 1935 were inappreciable) from data given in *New Zealand Year Book*.

Central Europe[1]

The problem of measuring the rates of growth for these countries has been made very much more complex by the sweeping boundary changes of 1919. Nevertheless a very careful survey of pre-war national income in Austria has been made by Waizner,[2] one of the most excellent investigations which it has ever been the writer's privilege to study. In this survey national income is computed for the average of the period 1911–1913, by the net output method, under twelve different heads. The views of Fellner, so strongly held in the neighbouring country of Hungary, that services should

[1] This section was written before March 1938. Some of it is now more of historical than of current interest

[2] *Metron*, 1927–28.

not be included in the national income, are not adhered to, and entries are made for income produced by public administration and professions, domestic service and the rent of dwellings. Allowances are made for income received from abroad and payments due abroad. In 1913 the former were considerably greater than the latter.

Each entry in his total is subdivided geographically by Waizner into six areas, viz. territories now forming part of present-day Austria, of Czechoslovakia, of Poland, of Italy, of Yugoslavia and of Roumania.

A somewhat similar investigation was undertaken by Fellner for Hungary.[1] In this case the definition is limited, excluding income produced by public administration, professions, domestic service and the rent of dwellings. In Waizner's calculation for 1913 these amount to 2881 million kroner out of a total national income of 15,325 million kroner. Fellner's total is 2660 million kroner (very small compared with Austria), and it is suggested that an addition of about 18 per cent should be made to it to cover unincluded services on the basis of their value in Austria. This total (but not the detailed entries) is also subdivided geographically into territories now forming part of present-day Hungary, Roumania, Czechoslovakia, Yugoslavia, Austria and Fiume. An estimate is also made of capital and land values in Hungary in 1913, and their division among the other States.

The income in 1911–13 of the territory constituting the Austria of 1919–38 was 4712 million kroner, or $953 millions. The reduction of these figures to a post-war scale of prices is very difficult. Two separate index numbers of retail prices are available, both calculated by the Bundesamt für Statistik.[2] A cost-of-living index number, for Vienna only, is available from 1926. For the average of the nine years 1926 to 1934, on the same base of 1914, the former gives a value of 105 and the latter of 142. This discrepancy is presumably due to the very low level of rents prevailing in Vienna in post-war years. As, however, in our calculation of the average value, at international prices, of the post-war Austrian national income, we used rent figures

[1] *Metron*, 1923.

[2] Quoted in *Statistisches Handbuch der Weltwirtschaft.*

relating to Vienna rather than to Austria as a whole, it is necessary that the former figure should be used in reducing pre-war incomes to 1925–34 values. This gives us $1009 millions at Austrian 1925–34 prices, or 1564 millions in international units, to which must be added 5·6 per cent for indirect taxation.

Allowance must also be made for changes in the working population. Data are available of the 1913 population of the territory which constituted the Austrian Republic, but the occupational Census records refer to Austria's pre-war boundaries. The territory of post-war Austria contained 0·9 per cent more population in 1913 than in 1930. In the post-war territory, 46·9 per cent of the population were occupied in 1934 and 48·1 per cent in 1920.[1] In the old territory, 52·3 per cent of the population were occupied in 1910 [2] and 51·5 per cent of the population in 1900.[3] It is probably the case, therefore, that the occupied population within the boundaries of the Austrian Republic was about 10 per cent higher in 1913 than in 1930.

On the basis of figures of national income and price and population changes, income per head in 1911–13 can be put at 565 I.U. per head as against 511 I.U. in 1925–34.

Certain confirmatory evidence may be examined. Figures relating to real wages at first sight appear to throw doubt on these conclusions. Real wages in 1928 as compared with 1914 [4] show an increase of 23 per cent for skilled men, 48 per cent for unskilled and 35 per cent for women. Possibly the average of these figures is somewhat raised by the inclusion of Viennese rather than rural real wages, the reduction of rents in Vienna owing to municipal house-building and rent restriction having had a considerable effect. Moreover, the real national income as a whole was much higher in 1928 than it was over the average of the decade 1925–34.

There is independent evidence to show that wage-earners had been obtaining a larger share of the national income. We can deduce this from figures collected by Dr. Morgenstern,[5] which he rather naïvely claims provide

[1] *League of Nations Statistical Year Book*, 1930.
[2] *Ibid*
[3] Juraschek, *Die Staaten Europas*.
[4] *I.L.R.*, 1928, 2nd vol. p. 787.
[5] *Zeitschrift fur Nationalokonomie*, 1931–32, p. 251.

a measure of capital consumption. The current market value in gold in 1913 of the entire share capital of 200 leading Austrian companies he found to be 4233 million schillings. Additions to capital, reduced to gold values at current rate of exchange, in the period 1913–23 amounted to a further 1172 million schillings, and in the period 1923–30 to a further 747 million schillings. The aggregate gold value in 1930 should therefore have been 6153 million schillings. Their actual value he found to be no more than 1921 million schillings, and he thereupon reached the problematical conclusion that two-thirds of Austrian capital had already been consumed. It is to be regretted that he did not add figures showing the extent to which real national income had fallen as a result of this situation, or state the further levels to which he expected it to fall after the remaining one-fifth of capital had disappeared.

A considerable part of the decline can be traced to the increase in interest rates. It is not clear whether or not Dr. Morgenstern wishes us to regard the increase in interest rates from 4·3 per cent to 7·2 per cent (which was the increase from 1913 to 1930) as tantamount to the destruction of 40 per cent of the community's capital. But at any given level of industrial profitability, a rise in interest rates has the effect of causing (other things being equal) a fall in the values of industrial securities. Since 1930 there has been a considerable reduction of interest rates and an almost exactly proportionate rise in the values of industrial securities in Austria.

If we accept the less far-fetched view that changes in security values, after discounting changes in interest rates, represent changes in the profitability of existing capital investments, we still reach the conclusion that profits on Austrian industrial capital were about 35 per cent below the 1913 level in 1928 and 55 per cent below in 1930. The position in 1937 appears to have been about the same as in 1930, while in intervening years 1931–34 it was considerably worse.

A rise in real wages, accompanied by a considerable

decline in other incomes, is consistent with the results so far obtained.

A considerable number of figures for Austrian and Austro-Hungarian national income in earlier years are available, but they appear to have been compiled on varying and incomplete bases. The lack of satisfactory price indexes further adds to the difficulty of interpretation. Figures are available for 1861 (Czoernig) and for 1867 and 1874 (Neumann-Spallart).[1] An estimate made by Inama-Sternegg, for Austria only, for 1893 amounted to 2400 million gulden.[2] A further estimate of Hungarian national income for 1907 was made by Fellner.[3]

Hungary

Figures have already been discussed under the heading of Austria. The national income in 1913 of present Hungarian territory was \$635 millions, which should be raised to perhaps \$710 millions by inclusion of indirect taxation. Using figures of gold cost of living, we obtain a figure of \$740 millions at Hungarian post-war prices, or 826 millions I.U. Statistics of the numbers of the occupied population in this territory in 1913 are not available and can only be estimated on the basis of change in recorded population between 1913 and 1930. On this basis the occupied population of this territory in 1913 was 3,015,000, and average real income per head 274 I.U. The post-war figure at 359 I.U. shows a distinct increase.

Roumania

For 1913, for the boundaries of that date, Dresdner Bank gives a population of 7·6 millions and a national income of 2 milliard marks, or \$475 millions. For the post-war boundaries they estimate a population of 16·2 millions and a national income of \$950 millions at that date. The income of the transferred territories was thus estimated as exactly equal to that of the old territory.

The calculations of Waizner and Fellner (the latter being adjusted so as to include an estimate of services on the basis suggested) show the income of the territories transferred from Austria and Hungary as 1971 million kroner, or \$399 millions. As has been found in other cases, the calculations of the Dresdner Bank are not necessarily in

[1] Quoted in Neumann-Spallart, *Uebersichten der Weltwirtschaft.* These figures refer to income from agricultural, mining and industry only, which in 1911–13 amounted to only 63 per cent of national income, and amount to 3360, 4300 and 5750 million florins respectively.

[2] Quoted by Fellner, *International Institute of Statistics, 1904–5 Session*

[3] *International Institute of Statistics, 1907 Session,* p. 37.

exact agreement with those of Waizner and Fellner. Nevertheless it is assumed in this case that the discrepancy of $75 millions represents the income of Bessarabia (territory transferred from Russia to Roumania in 1918). The population of this province in 1913 is not known, but assuming a somewhat lower income per head than the other territories, may be put at 1·5 millions. Including Austro-Hungarian indirect taxation at 5 per cent of national income, the income of transferred territories may be put at $500 millions

The figure of $475 millions for the old territory must be increased on account of Roumanian indirect taxation, which was exceedingly high in that year (during 1913 Roumania was engaged in a war with Bulgaria), and revenue from taxation was 600 million lei, or $116 millions, at the current rate of exchange, of which $80 millions is assumed to have been indirect taxation, giving us a total of $555 millions. The total for present boundaries, including indirect taxation, was thus $1055 millions. The post-war exchange value of the lei was fixed at a very low level, and so the gold cost of living averaged over the decade 1925–34 was only 2½ per cent higher than in 1913. At post-war prices, therefore, the 1913 income of present-day Roumanian territory becomes $1082 millions or 1640 million international units. Average income in 1925–34 in international units was 1438 millions or definitely below the pre-war figure, while the population had increased from 16·2 millions to 17·75 millions. Information of the numbers of the occupied population in 1913 is lacking, but assuming that it was 34 per cent of the whole (as assumed for 1925–34), we have an occupied population in 1913 of 5,510,000, and an average income per head of 298 international units as against 238 in 1925–34.

This decline may appear surprising in view of the supposed growth of industrial and mining output in this country. The following, however, are the figures of the net output of industry in million lei of 1913 purchasing power, figures for other years being reduced to that base by the cost-of-living index number.

	Million lei		Million lei
1913	884	1929	560
1925	326	1932	570

Yugoslavia

The Dresdner Bank gives 4·75 millions of population in 1913 in the old boundaries of Serbia and Montenegro, with a national income of 1100 million marks. In the same year, for the present-day boundaries, they give a population of 12·8 millions and a national income of 3500 million marks. Their estimate of the income of the trans-

ferred territories is thus $570 millions, giving $831 millions for the 1913 income of the present territory, while the calculations of Waizner and Fellner show the income of the transferred territories to have been 2146 million kroner, or $434 millions, making a total of $695 millions only. Gini [1] (presumably working on the same sources as the Dresdner Bank) gives a total of $840 millions for the present boundaries of Yugoslavia.

It appears that different price levels may have prevailed in different parts of the territory, and the two portions of the national income must therefore be re-valued separately. Making a comparatively large addition for indirect taxation, on the grounds that Serbia was also engaged in the Balkan war at that date, we may raise the figure of the old territory from $261 millions to $300 millions. To convert this into international units we make use of the fact that in January 1931, taking the exchange value of the dinar at 9·17 per cent of its old parity (the rate then prevailing), we found that prices in Yugoslavia were 68 per cent of the U.S.A. level. In 1926 the exchange value of the dinar was the same as in 1931. Internal prices in Yugoslavia at the date were 32 per cent higher than in 1931: and gold prices in Yugoslavia were 63·2 as compared with 100 in U.S.A. in 1925–34, and pre-war income in international units was 474 millions.

The 1913 income of the transferred territories (taking Waizner and Fellner's figure) was $343 millions, which may be re-valued on the basis of the Hungarian price index number and taxation figure. Including taxation, this becomes 565 million international units, and the 1913 income of the whole present territory of Yugoslavia becomes 1039 million international units.

The only occupational census of Yugoslavia was that of 1921. Excluding women engaged in agriculture, occupied population was 30 per cent of the total population. This figure may appear low, but 35 per cent of the population were under the age of 15, and there was very little paid work for women. Assuming this proportion for other years, we find an occupied population of 3,840,000 in 1913 and an average income of 271 units per head.

For national income we have a fairly detailed estimate of 80·1 milliard dinars for the year 1925,[2] and the following : [3]

	Milliard dinars		Milliard dinars
1929 . .	69	1935 . . .	37 5
1932 . .	32	1937 . . .	44·2

[1] *Metron*, 1933

[2] V. M. Djuričić, M.B. Tošić, A. Wegner, P. Rudčencenko, Dr. M. R. Djordjević, *Nasa narodna privreda i nacionalni prihod*, Sarajevo, 1927.

[3] Frangeš, *Weltwirtschaftliches Archiv*, September 1938

To reduce these figures to international units, we require a comparison of prices in Yugoslavia in 1925, 1929 and January 1931 (for which date we can make a link with international prices), and for the later years. The official price index number begins in the year 1926 and a link between 1925 and 1926 is necessary. In the following table, data of price changes between 1925 and 1926 are taken from import and export statistics. Wholesale prices are used throughout, as more representative of the conditions under which the bulk of the national produce was sold or consumed.

Wheat	− 3	Cattle	− 29	Cotton	− 6
Rye	− 41	Pigs	− 36	Wool	+ 6
Barley	− 30	Eggs	− 13	Coal	− 9
Oats	− 12	Meat	− 20	Cotton yarn	− 12
Maize	− 26	Wood	− 31	Wool yarn	− 14
Apples	− 35	Copper	− 20	Cotton cloth	− 6
Plums	− 10	Cement	− 20	Wool cloth	+ 3
Tobacco	+ 51				

The median of the above shows a fall of 17 per cent, which is taken as the representative figure. On this basis, prices in 1925 (1926 = 100) were 120·4 as against 100·6 in 1929 and 75·7 in January 1931. At that date Yugoslavian prices were 67·6 per cent of current American prices, or 66·5 per cent of American 1925–34 prices. The exchange value of the dinar in 1931 was 1·76 cents, and therefore 1 dinar in January 1931 was worth 0·0265 I.U. We have therefore :

	1925	1929	1932	1935	1937
National income as recorded (milliard dinars)	80·1	69	32	37·5	44·2
Inclusive of indirect taxation (taken at two-thirds of total tax revenue)	84·5	75·0	36·1	42·1	51·5
Reduced to January 1931 prices	53·0	56·5	41·9	48·4	52·0
Income in I.U. (millions)	1403	1498	1110	1280	1379
Occupied population (taken at 30 per cent of total population) (thousands)	3847	4072	4254	4455	4584
I.U. per head	365	367	261	287	300

The average over the decade 1925–34 may be taken at 330 I.U. per head.

Czechoslovakia

Gini, in the tables already quoted, gives a 1913 income of $1460 millions. Taking the tables by Waizner and Fellner already quoted for the income of the pre-war territories of Austria and Hungary, and adding the amounts apportioned from each of these to Czechoslovakia, we obtain a total of $1636 millions. Taking the mean of these two results and making an addition for indirect taxation, we obtain the total of $1625 millions, equivalent to $1715 millions at Czechoslovak post-war gold prices, or $2322 millions in international units. No pre-war census data of the occupations of the population are available, but the population occupying the present boundaries of Czechoslovakia rose by 4·5 per cent between 1913 and 1930, while aggregate real income rose 15·5 per cent. Real income per head may be estimated to have risen 10·8 per cent, and to have been $411 per head in 1913.

It is of interest to make some calculations on the vexed question of the alleged economic disadvantages consequent upon the break-up of the old Austro-Hungarian Empire. Though this has been a favourite subject of discussion ever since 1919, no attempt has apparently been made to examine the problem in the light of national-income data.

Figures have been assembled showing comparable units of national incomes of all the Succession States. The work of Waizner and Fellner has been used to partition the national income of the old Austro-Hungarian territory. No precise basis, however, is available for the allocation of indirect taxation. Central and local taxation in Austro-Hungary in 1913 was 2100 million kroner.[1] Allowing for the fact that about 20 per cent of Austrian national income was transferred to Poland and Italy and therefore does not appear in the table below, and for the proportion of direct taxation, we can estimate 350 millions in international units as the aggregate burden of indirect taxation for 1913. The 1913 figures for the Succession States in the table below are shown exclusive of Austro-Hungarian taxation for that year,

[1] Shirras, *Journal of the Royal Statistical Society*, 1925, p. 543.

though inclusive of taxation levied in Roumania and Serbia respectively.

In the same way we may make a single reckoning of the occupied population in 1913 in Austro-Hungarian territory of that date. In the old territory of Austria, in the Census of 1910, the ratio of occupied to total population, excluding women engaged in agriculture, was found to be 37·3 per cent. In Hungary, the proportion of 36 per cent. We may assume that 37 per cent of the population of Austro-Hungarian territory as a whole was occupied.

We therefore have the following :

	Income, millions of I U.		Occupied Population, thousands		
	1925–34	1913, excluding Austro-Hungarian Taxation	1930	1913, Old Boundaries	1913, Post-war Boundaries
Austria	1442	1564	2,822	..	2,520
Hungary	1205	738	3,357	..	2,920
Roumania	1438	1597	6,050	2,396	5,020
Yugoslavia	1819	965	4,100	1,400	4,380
Czechoslovakia	2680	2086	5,900	..	5,180
Austro-Hungary (Taxation and occupied population)	..	350	..	16,210	..
TOTAL	8584	7038	22,229	20,006	..
PER HEAD	386	352	..	..	..

The Austro-Hungarian population is made up as follows :

1913 POPULATIONS

(Millions)

Austria, post-war boundaries	6·8
Hungary, ,, ,,	7·9
Transferred to Czechoslovakia	14·0
,, to Yugoslavia	8·05
,, to Roumania	7·1

Average real income per head over Central Europe as a whole, in spite of all, appears to be now distinctly higher than it was in 1913.

Switzerland

Post-war data for Switzerland are not satisfactory. Lindahl quotes two rough estimates by Obrecht for 1929 and 1934 (10 and 6·5 milliard francs respectively). A comprehensive determination for 1924 was made by Wyler (*Zeitschrift für Schweizerische Statistik und Wirtschaft*, 1927, p. 359).

Using Wyler's data as a basis, Marschak and Lederer in *Kapitalbildung* make an estimate for money national income for each year to 1930 by use of two index figures of aggregate wage payments and aggregate income from capital. The former is obtained from accident insurance statistics and the latter from the yield of "Coupon Tax".

NATIONAL INCOME
(Million francs)

Year	Agriculture	Wages	Profits of Companies making Returns	Other Income		Total *
				Marschak-Lederer	Amended	
1924	1504	5200	..	2240	1846	8,550
1925	1534	5430	416	2600	2120	9,084
1926	1431	5490	400	2940	2370	9,291
1927	1396	5660	493	3120	2480	9,536
1928	1467	6110	569	3430	2690	10,267
1929	1479	6570	592	3360	2616	10,665
1930	1371	6630	512	3400	2600	10,601
1931	1403	5950	309		1545	8,898
1932	1262	5015	243		1212	7,489 †
1933	1220	4490	236		1180	6,890 †
1934	1228	4062	242	..	1210	6,500 †

* Average 1925–34, 8921 million francs
† *Tax Systems of the World* gives estimates by Dr. Higy as follows 1932, 7920 m fr.; 1933, 7760 m.fr.. ; 1934, 7480 m fr

The present writer has revised and extended their table by the inclusion of agricultural income, as given in the annual statistics, and adjusting the data of capital incomes so as to give Wyler's total again for 1924, and 10,665 million francs, or the mean of the Obrecht and Marschak-Lederer values for 1929, and Obrecht's figure for 1934. The wage statistics are carried on as before. For other incomes the figures of dividends [1] of Swiss companies are used for 1931 onwards. These figures are related to the old series, first by converting dividends into profits inclusive of undistributed by means of the factor quoted by Marschak and Lederer (p. 300, Table S, IX) for each year

[1] *Statistisches Jahrbuch für das Deutsche Reich*, 1936.

from 1925 to 1930. It is found that the profits of these companies average 0·200 of the whole aggregate of profits during 1925–30, and this factor is assumed to prevail for the later years. From 1931 onwards the whole of their profits is assumed to have been paid in dividends.

Dresdner Bank gives, for 1913, 3870 million francs.[1] Inclusive of indirect taxation (Lindahl), this becomes 4209 million francs, or 6390 million francs at 1925–34 prices. This is equivalent to $1232 millions at Swiss post-war prices, or 1322 million I.U. Occupied population, exclusive of women engaged in agriculture, numbered 1,682,000 in 1910 and 1,732,000 in 1913. Average real income per head in 1913 in international units was therefore 764. There was a very marked increase from this level to the figure of 1018 in the period 1925–34.

We are fortunate in being able to obtain for this country some carefully compiled figures of an earlier date.[2] National-income figures have been calculated for 1890, 1895 and 1899, using the same limited definition. No entry is made for income from professions, public administration or domestic service, but net income from foreign investment is included. We have, however, figures of the numbers of the occupied population engaged in these and other activities, for the census year 1888 [3] and for 1910.[4] If we make the assumption that the average income per head in these occupations (which only employed 6½ per cent of the working population), excluding females engaged in agriculture from working population, in 1888 was the same as the average *home-produced* income per head in other occupations, we obtain national-income figures of 1930 million francs, 2170 million francs and 2230 million francs respectively.

The ratio of occupied to total population was 40·6 in 1888, and 44·8 in 1910. These ratios are interpolated. To reduce these figures to 1913 price level, cost-of-living figures for France are used. We then have:

Year	Population, thousands	Per cent Occupied	Occupied Population, thousands	National Income, million francs	Do., per Occupied Person, francs	Do., including Indirect Taxation.	Do., at 1913 Prices
1890	2917	41·0	1194	1930	1613	1758	1933
1895	3116	41·9	1307	2170	1661	1809	2018
1899	3275	42·7	1400	2230	1665	1813	2048

[1] Average of three data given: a figure of 4000 million francs is given by Shirras, *J.R.S.S.*, 1925, p. 543.

[2] Geering and Hotz, *Wirtschaftskunde der Schweiz*, 1902.

[3] Juraschek, *Die Staaten Europas*.

[4] *League of Nations Statistical Year Book*, 1930.

These values may be compared with the figure of 2340 francs per head in 1913. In international units these figures become 609, 634 and 644 per head respectively as compared with 764 in 1913. Average working hours for post-war years are taken as 48 (*I.L.O. Year Book*) and were 56 about 1909 (*Abstract of Foreign Labour Statistics*). For the 'nineties an average of 60 is assumed.

Belgium

Lindahl (*loc. cit*) quotes an estimate by Baudhuin[1] of 6500 million francs for 1913. Including indirect taxation, this figure becomes 6727 million francs, or 49·6 milliard francs at average prices prevailing in the period 1925–34. The numbers of occupied population, excluding females engaged in agriculture, amounted to 3,276,000 in 1910, and may be estimated at 3,366,000 in 1913 on the basis of the rate of change of population. Belgian prices in 1925–34 were 30·1 per cent below American prices. We thus obtain a figure of 589 I.U. real income per head of the occupied population, as against 600 I.U. for the average of the period 1925–34. The only confirmatory evidence from the side of real wages relates to changes in the 37-year interval between 1891 and 1928.[2] During this period the average wage of men had risen from 4·09 francs per day to 41·48, and the cost of a family budget from 19·99 to 172·29 francs. On this basis there had been an increase in real wages of 17½ per cent. At the same time hours had been reduced from 10 per day to 8.

Bulgaria

Dresdner Bank (*loc. cit.*), quoting Tschakaloff, gives a figure of $356 millions for national income in 1913, to which approximately $25 millions may be added to allow for indirect taxation. Gini[3] gives a similar figure of $326 millions. These figures relate to the 1913 boundaries of Bulgaria. The Bulgarian leva was devalued in 1928 to 3·75 per cent of its old parity. The money cost of living rose twenty-nine-fold between 1914 and 1928, but the gold cost of living remained practically unchanged, and the addition of only 1½ per cent to the pre-war gold national-income figures is necessary to reduce them to post-war values.

The numbers occupied, excluding women engaged in agriculture, were 1,232,000 in 1910,[4] and may be estimated at 1,303,000 for 1913.

[1] This figure is also quoted by Dresdner Bank, though Gini quotes a higher figure of 7 to 7½ milliards.

[2] Gottschalk, *I L.R.*, vol. 25.

[3] *Metron*, 1933.

[4] *League of Nations Statistical Year Book*, 1930. All other pre-war figures of occupied population, unless specially indicated, are derived from this source.

This gives us an average income of $317 per head of the occupied population, or 479 I.U. The fall from this level to 259 I.U. in the post-war years is very marked. It has been accompanied by a very marked increase in population, amounting to about 30 per cent between 1913 and 1930.

Denmark

For 1913 the Dresdner Bank gives a total of $477 millions (present-day boundaries) and Professor Gini $485 millions, of which he estimates that $60 millions represents unpaid family labour. It is not clear whether or not this figure should be included for comparison with later dates. Taking the Dresdner Bank figure, and adding $16 millions for indirect taxation, we obtain a total of $493 millions. Occupied population, excluding women engaged in agriculture, numbered 1,120,000 for present-day boundaries in 1913. This gives a figure of 688 I.U., in comparison with the average of 680 I.U. for 1925–34. During this period, as we can deduce by comparing changes in hourly and annual average wages, there was a reduction of working hours by 17 per cent. Figures published by the International Labour Office show that between 1913 and the average of 1925–34, real hourly wages in Denmark rose by 53·6 per cent; as pointed out, hours were considerably reduced and real annual wages therefore rose by 31 per cent. It appears, however, that in this country the wage-earner has gained considerably at the expense of other sections of the community.

To compute the trend of real income per person in work, the following calculations can be made on the basis of Professor Lindahl's figures:

I U				
Year	Real Income per Head of Population	Real Income per Head of Occupied Population	Real Income per Head of Occupied Population in Work	Do, on 48-hour Week Basis
1913	..	688	704	585
1925	642	658	716	716
1926	660	672	771	771
1927	645	654	765	765
1928	650	655	746	746
1929	680	682	762	762
1930	727	727	805	805
1931	727	722	822	822
1932	690	684	887	887
1933	689	679	862	862

Italy

The national income of Italy in 1913 with the boundaries of that year was estimated by Gini at 19 milliard lire (quoted by Dresdner Bank). Including indirect taxation (quoted by Lindahl), this figure becomes 20,011 million lire, or 94·8 milliard lire at 1925–34 prices. The occupied population, excluding females engaged in agriculture, was 13,430,000 in 1911, and may be estimated at 13,597,000 in 1913. Converting lire to dollars at the post-war rate of exchange, this gives us an average income per head of \$368 at the Italian post-war prices, or 410 I.U. There has been a substantial decline from this level to the average of 343 I.U. calculated for 1925–34. Earlier estimates are available by Nitti for 1893,[1] of 7 milliard lire, at which time State and local taxation amounted to 1715 million lire (in 1913, when the national income had risen to 19 milliards, taxation was only 2227 million lire), and by Bolton King for 1903,[2] who puts it at £300-320 millions, to which should be added £50 millions for public income from indirect taxation and State properties. Bolton King made an examination of the retail price of foodstuffs and other articles at that time, and concludes that they were very similar to the prices prevailing in England. His figure of national income is based on some further calculations, relating to 1901, by Nitti.

We can relate the price levels in these years to the present day by use of the British retail price index number.

Year	Occupied Population	Sterling Equivalent of National Income, £ million	Do., per Head	Do., at British Prices of 1913	Do., at British Prices, 1925–34	Do., I.U.
1893	11,980	327	27·3	31·0	48·6	254
1901	12,750	370	29·0	31·9	50·1	262

Latvia

Dresdner Bank gives \$65·3 per head of the population for 1913. This may be written as \$166 per head of the occupied population, or \$183 including indirect taxation. The gold cost of living in Latvia in 1925–34 was actually lower than in 1913, and at 1925–34 prices this figure becomes \$176·5, or 225 in international units. There has been a considerable increase between 1913 and the last decade.

[1] *Economic Journal*, 1893, p. 156.
[2] *Journal of the Royal Statistical Society*, 1903, p. 218.

Lithuania

Dresdner Bank gives $56 per head of population in 1913. Equivalent per head of the occupied population, $142·8; including indirect taxation, $156; at post-war prices, $182; in international units, 218. In this case there appears to have been a decline since pre-war years.

Norway

Lindahl gave the national income for 1913 at 1150 million kroner. Occupied population, excluding women engaged in agriculture, was 892,000 in 1910, equivalent to 907,000 in 1913 (see table opposite).

National income as given by Lindahl for 1913 and 1925–34; estimated from taxation returns for other years. Average hours of work for 1936 and 1937 given in *I.L.O. Year Book* (from Statistics of Establishments). For 1935 average hours of work for all the occupations shown in the *I.L.O. Year Book* were 48, and this figure is assumed to have prevailed since 1924. Hours in 1913 estimated from *Abstract of Foreign Labour Statistics*. A factor is given on p. 75 for converting the Trade Union unemployment percentage into a percentage applicable to the whole non-agricultural occupied population. This factor must be further reduced to obtain unemployment figures applicable to the whole occupied population.

A detailed calculation by Kiaer is also available for 1891.[1] The total national income is estimated by the net output method, and a total obtained of 581 million kroner, including 90 million kroner as the estimated valuation of unpaid domestic work of 30,000 women.

This estimate is closely confirmed by another method. He also gives the numbers of the occupied population at that date. Excluding women engaged in agriculture and unpaid domestic work, there were 840,000. Index figures showing the change in Norwegian cost of living for this period are not available. If we use Myrdal's figure for Sweden,[2] we can revalue the Norwegian national income of 1891 at 1913 prices, when it becomes 583 million kroner. Real income per head of the population appears to have risen no less than 82 per cent between 1891 and 1913.

[1] *Statsokonomisk Tidskrift, 1892,* reprinted in *Journal of the Royal Statistical Society*, 1895, p. 515.

[2] *Cost of Living in Sweden, 1830–1930.* Published in "Stockholm Economic Studies".

Year	Taxable Incomes, million kroner	Total National Income, million kroner	Including Indirect Taxes, million kroner	At 1925–34 Prices, million kroner	I.U., millions	Occupied Population, thousands	Trade Union Unemployment Percentage × 0 364	Average Hours of Work per Week	Average Income I U. per Head		
									In Work, 60-Hour Week Basis	In Work, Current Hours	In Work, and Unemployed
1913	930	1150	1226	2095	469	907	1·0	60	522	522	517
1924	2757	3300	3500	2500	559	1070	3·1	48	685	548	531
1925	2770	3300	3510	2550	571	1080	4·8	48	694	555	528
1926	2470	2800	3010	2585	578	1090	8·8	48	726	581	530
1927	2252	2600	2810	2670	597	1100	9·2	48	746	597	542
1928	2153	2500	2740	2610	583	1108	7·0	48	707	566	526
1929	2200	2600	2830	2915	652	1116	5·6	48	774	619	584
1930	2197	2600	2820	2995	669	1126	6·0	48	791	632	594
1931	1995	2200	2410	2695	603	1138	8·1	48	720	576	529
1932	1934	2200	2410	2765	618	1148	11·2	48	758	606	538
1933	1902	2200	2420	2820	630	1157	12·2	48	776	621	545
1934	1954	2200	2430	2810	628	1167	11·2	48	758	606	538
1935	2076	2350	2620	2970	664	1177	9·2	48	776	621	564
1936	2306	2700	3010	3325	744	1187	6·8	45·5	885	671	625
1937	2637	3100	3430	3535	790	1197	6·0	44·9	938	702	660

The following are data for individual years:

Year	Real Income per Head of Occupied Population, I U.	Do, per Person in Work	Do, on 48-hour Week Basis
1891	285	288	230
1913	520	525	420
1925	510	536	536
1926	507	556	556
1927	520	572	572
1928	536	576	576
1929	579	613	613
1930	594	631	631
1931	526	572	572
1932	537	605	605
1933	542	617	617
1934	536	603	603
1935	565	622	622

Holland

Gini[1] gives a figure of 2760 million guilders for 1913 and the same figure is used by Dresdner Bank. This is raised to 2872 million guilders by the inclusion of indirect taxation (Lindahl) and becomes 4350 million guilders at post-war prices. Occupied population, excluding women engaged in agriculture, can be estimated at 2,280,000 for 1913, and average real income per head $768 at Dutch

Year	Occupied Population, thousands	Do., less Unemployed, thousands	Real Income per Head of Occupied Population, I U	Do, per Person in Work, I U.
1913	2280	2200	975	1010 (60-hour wk.)
1925	2879	2685	862	924
1926	2923	2734	913	976
1927	2965	2780	915	975
1928	3010	2866	951	998
1929	3054	2885	967	1022
1930	3101	2894	943	1011
1931	3148	2755	848	968
1932	3022	2536	775	978
1933	3245	2534	721	923
1934	3290	2558	662	851

48-hour week

[1] *Metron*, 1933.

1925–34 prices, 975 in international units. The apparent decline in real income per head between 1913 and the post-war years is largely accounted for by reductions in working hours, which appear to have fallen from an average of 60 per week in 1913 to 40 in the post-war years.

Portugal

Figures are available for 1914 but for no other year. Vandellos[1] gives an approximate estimate of 2440 million gold francs. This is equivalent to $471 millions, or $520 millions including indirect taxation. Occupied population, excluding women engaged in agriculture, was 2,220,000 in 1911 and can be estimated at 2,270,000 in 1914. Price comparisons between Portugal and U.S.A. can be made approximately for 1931, in which year gold prices in Portugal were 65 9 per cent of prices in U S.A.

The currency was devalued in 1931 to 4·1 per cent of its old parity The cost of living had only risen twentyfold since 1913; thus the gold cost of living in 1931 was only 80 per cent of what it had been in 1913 The gold cost of living in Portugal in 1914 can therefore be put at 73·9 per cent of American cost of living for 1925–34, and average income per head in Portugal in 1914 at 310 in international units.

India

Professor Rao in *Essay on India's National Income, 1925–29*, considers that three previous estimates can be adjusted to a basis of comparability with his own:

Date	Source	National Income Rs per Head of Population		Estimated I U per Occupied Person
		Current Prices	At 1925–29 Prices	
1867–8	Naoroji	23 5	44 2	112
1895	Atkinson	31·5	55 2	140
1921–2	Shah and Khambata	88·0	78 0	198
1925–9	Rao	78·0	78 0	198

Other Countries

The Dresdner Bank gives for Greece a national income of 1485 million drachmae in 1913, which is equivalent to 26·1 milliard at 1925–34 prices, as against

[1] *Metron*, 1925.

33·6 milliard of income in 1925–34. The increase of 29 per cent is slightly less than the population increase of 32 per cent.

For three other countries we have :

	Average Income in Marks per Head of Population at 1913 Prices		
	Poland	Finland	Estonia
1913	320	310	304
1924	208	309	..
1926	224	..	..
1928	..	..	290

We can now assemble all the figures previously calculated to obtain a general conspectus of the rate of economic progress in different parts of the world over the last eighty years. Firstly, we can examine the levels and rates of growth of average real income produced per labour-hour *actually worked*. Later we will examine the results (sometimes very different) concerning average real income per head of the working population, employed and unemployed taken together. These figures were obtained in the first instance by a comparison over the decade 1925–34, and expressed in international units, an actual comparison of the purchasing power of money in different countries being made at the same period. For other years, changes in real income are calculated on the basis of the price index number applicable to each country, and factors of change thus obtained are applied to the original data of the basic period 1925–34. The further we are removed from this period, therefore, the greater the possibility of error ; though in most cases it is the rate of growth we are interested in rather than the absolute level. A very rough indication of the latter is all that we require, and that can be obtained from this scheme of presentation.

Allowance has also been made for the different level of working hours in different countries and the change in this figure over a period of years. These allowances in many cases are very arbitrary. It would, however, be

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more misleading to have used the data without making any such allowance.

The data are shown on a logarithmic scale, a given vertical height on the scale corresponding to a given proportionate change in the figure. We are thus enabled to judge and compare proportionate rates of progress in different times and countries by comparing the steepness of the slopes.

For the U.S.A. the diagram shows most strikingly, though similar trends are to be seen in some other countries, the sudden slowing down in the rate of growth which occurred about the year 1900. Canada, for the years for which information is available, shows a very similar movement to that of the U.S.A., while the slowing down of the rate of economic development in France and the marked decline in Holland are both of considerable interest.

It should be repeated that this information refers to average real income produced per head of the occupied population, including the unemployed as well as those in work. Where the normal working week differs from 48 hours, the figures of real income per head of the whole community are adjusted by a simple proportion to put them on a 48-hour week basis.

The slowing down of the rate of upward movement in any country may therefore equally well, so far as this diagram is concerned, represent declining productivity per worker-hour, or increasing unemployment. It will be shown later that in the case of the U.S.A. the whole flattening of the curve is attributable to increasing unemployment or short-time working, productivity per worker-hour having continued to increase steadily.

In Great Britain the growth of real income per head slowed down very considerably after 1900. Productivity per worker-hour only increased slowly during the first fourteen years of this century in Great Britain, and there was no serious unemployment. Since 1924 there has been a very marked expansion of productivity per worker-hour which has brought up the average real income in

spite of considerable unemployment. Making full allowance for the effect of the trade cycle, the average income of the British population, working and unemployed taken together, at the peak of the trade cycle in 1937 was markedly higher than it had been at the peak of the previous trade cycle in 1929, or at any previous date.

In France, on the other hand, there appears to have been an almost complete cessation of economic growth since the beginning of the present century. Until very recently at any rate this was certainly not attributable to unemployment.

Germany showed a gradual slowing down of the rate of growth similar to that of Great Britain about the beginning of the present century. The curve on the diagram is broken at 1913. Average income per head in the post-war German boundaries was distinctly higher than in the old boundaries, and the upper curve represents continuous figures of average income per head in the new boundaries. Germany suffered severely from the war and the inflation, and only made a partial recovery before she was again struck very severely by the world depression. The strong rise of real income per head between 1932 and 1937 has brought Germany back to a point about in line with the pre-war trend of development. It remains to be seen whether Germany can " abolish the trade cycle " and develop production further from the point now reached.

The world's highest level of real income per head has now been reached by New Zealand, which already had a high income per head at the beginning of the century and has shown an almost uninterrupted upward trend. Australia had reached a rather lower level of income per head by the 1890's, and then followed a long period of stagnation to 1921. Australian production per head was hit severely by the depression. However, Australian figures also show an upward trend, production per head in 1937–38 being also above previous records.

By far the most sustained upward trend is that shown by Sweden, with comparatively little interruption either

from the war or the depression. If this rate of progress can be maintained, Sweden is likely to overtake the present leading industrial countries in another twenty or thirty years. Norway followed a parallel development to Sweden.

Italy, starting from a low level, has shown a fairly steady upward trend. Japan has shown an exceedingly rapid upward trend from 1900 to 1930, but since that date there are unmistakable signs of slowing down.

The comparative stagnation of Russia between 1870 and 1913 is based on scanty evidence for years prior to 1900, though the low rate of growth between 1900 and 1913 is based on a more detailed calculation. No feasible revision of the 1870 figure, however, would show a rate of growth much more rapid than that indicated in the diagram. The effects of the war, revolution and inflation on the Russian economy were tremendous, and by 1921 income per head had fallen to 129 units, or about that of China. From 1921 to 1925 recovery was very rapid, but from that date the rate of progress slowed down, and it is only recently that the 1913 level has been overpassed.

Over the period 1913–30 interesting conclusions on the relation between income changes and population growth can be obtained by summarising all the results obtained above in the form of a table comparing the percentage rate of change in real income per head, the fall in average number of working hours (where known) and the percentage rate of increase in working population. In the opinion of many, and as has indeed been hinted already above, the rate of increase of population should be an important factor in determining the change in average real income per head. A rapid increase in population should, in accordance with theoretical expectation, be associated with stationary or declining average real income per head in a primary producing country, and with the reverse in a secondary producing country.

The table which follows must serve in the first instance to illumine the deficiencies of our information,

and many of the figures will be viewed with severe qualifications by the reader of the foregoing pages.

Some comments may be made on the categories included. In the first place, it is clearly a logical error to expect any correlation in changes in *total* population and average income per head; the more direct causal relationship is clearly between changes in *working* population and in average real income per head. The figures of average real income per head show "potential" income, i.e. income which would be obtained if the whole working population were in employment. Figures for changes in working hours are shown in a separate column and in many cases are not available.

In attempting to test in this way the validity or otherwise of the Malthusian doctrine, there is clearly an important subsidiary consideration as to the absolute level of average real income per head at the beginning of the period of comparison. A country in which average real income per head was low at the beginning of the period may be expected to have less economic surplus available for the promotion of secondary industries or of international trade, and therefore be more likely to suffer a reduction in average real income per head as a result of an increase in population. The next column is included to indicate the extent to which various countries were dependent on agricultural production for their income, while the last column is designed to draw attention to the extent to which diminishing returns can be avoided through a reduction in the proportion of the population engaged in primary production.

In the following table the countries are ranged in order of the rate of increase of working population over the whole period 1913–30. This order of increase is remarkable. In Germany the increase is partly accounted for by the pressing into employment of hitherto unoccupied classes as a consequence of the inflation; in U.S.A., Canada, Australia and Greece the increase is largely accounted for by immigration; in the other countries by natural increase alone.

	% Rate of Increase in Working Population, 1913–30	% Change in Real Income per Head (potential), 1913 to 1925–34	% Fall in Working Hours	Level of Real Income, 1913, I.U. per Head of Working Population	% of Workers in Primary Production, 1930	Reduction in Percentage of Working Population engaged in Primary Production, 1913–30
Bulgaria	41·2	−18	*	317	67·3	0
Germany	38·8	−22	23	957	24·3	0
Holland	38·2	−7	20	975	20·8	8
Canada	34·8	+22	15	1182	34·9	0
Greece	31·8	+4	*	383	44·2	*
U.S.A.	24·5	+16	9	1333	22·5	8
Norway	24·1	+13	20	520	35·3	4
Finland	23·9	−1	*	383	51·0	*
Australia	21·0	+39	7	786	24·4	5
Sweden	18·8	+23	17	567	32·3	8
Russia	17·1	−4	20?	333	74·1	6
Denmark	16·8	+9	17	668	35·7	7
Japan	14·5	+105	10	172	50·3	10
Italy	14·1	−12	30	410	42·9	2
Hungary	11·4	+31	*	274	54·1	0
Britain	10·0	+13	11	1072	6·4	2
Roumania	9·8	−20	*	298	*	*
Switzerland	8·6	+38	12	764	21·3	6
Spain	8·2	+39	*	511	57·0	*
Yugoslavia	6·7	+23	*	271	*	*
Czechoslovakia	4·5	+16	*	411	27·3	*
France	3·4	−8	20	786	25·0	5
Belgium	0·7	+1	*	589	17·1	5
Austria	−9·0	+1	*	565	24·5	0

* Signifies unknown.

In the three countries with the greatest population increase there was a decline in average real income per head,[1] although in Germany and Holland this was associated with a reduction of working hours. It must not be assumed that if these countries had maintained working hours on their old level, average income per head would necessarily have been higher. There is a strong presumption that it would not. The reverse side of this argument is probably also valid, namely, that a reduction of working hours is a satisfactory palliative for countries persecuted by the Malthusian devil.

The Indian statistics quoted previously are of great interest. A population increase of 30 per cent between 1871 and 1891 was accompanied by a 25 per cent increase of real income per head, while the much slower

[1] Judging from statistics of real wages, Syria seems to have been a country in which there was an exceptionally severe fall in standards of living. Figures quoted in *International Labour Review* (April 1939) show that real wages in 1937 were only about half their 1913 level. The trend of population in this country, unfortunately, is not known.

increase of only 11 per cent in the thirty years 1891–1921 was accompanied by a 42 per cent increase in real income per head. (This slowing down of population growth was due to epidemic and famine.) From 1921 to 1931 the rate of population growth was 11 per cent in a single decade, and this was accompanied by stationariness of average real income per head in spite of India's growing industrialisation.

In Canada, where considerable new productive resources were exploited during this period there was a marked increase in average real income per head and a reduction in working hours (although real income per head had been declining in the years prior to 1914). In U.S.A. there was no further exploitation of primary resources, but a great development of secondary and tertiary industries, and 8 per cent of the working population was transferred away from primary production to other activities. Under these circumstances also a great increase in (potential) average real income per head was obtained, together with a reduction of hours. The transference away from agriculture of as much as 8 per cent of the whole working population during this period must be adjudged a high rate of transfer, and was shown only by Japan, the U.S.A., Holland and Sweden. There is certainly a presumption that this rapid transfer in Holland, together with the existence of a considerable surplus of economic resources at the beginning of the period, served to obviate what might otherwise have been a considerable drop in average real income per head in the face of this very rapid population increase.

In Norway the increase in real income and the reduction of working hours was associated with the opening up of new manufacturing resources and with a moderate transfer of population away from agriculture. Very marked increases in average real income per hour are shown by Australia and Sweden, in both of which countries the increase in working population was of the same order of magnitude and in both of which there was a considerable transfer of population away from primary

production. The same applies, to a somewhat less degree, to Denmark. In Russia, on the other hand, where 74 per cent of the working population were still engaged in agriculture in 1930 in spite of a considerable transfer during the previous period, there had been a slight decline in average real income per head, although this country also had adopted the palliative mentioned above of a considerable reduction of working hours.

The most marked increases in average real income per head are shown by Japan and Yugoslavia. In the case of Japan there appears to have been a very rapid movement of population away from primary production, while for Yugoslavia the figures are lacking. But it is also significant to notice that the increase in Japanese working population was very much less than that of a number of other countries.

In Italy the increase in population was the same as in Japan. But in this country average real income per head has declined while in Japan it has rapidly increased, with the result that the level of average real income per head in the two countries is today about the same, while in 1913 it was widely different. Presumably the war had a much more serious effect on Italian economic development than on Japan's, but, even so, the discrepancy is startling.

There is undoubtedly a group of countries with high income increases at the lower end of the table, namely Switzerland, Spain, Yugoslavia and Czechoslovakia, in each of which the population increase was moderate while the increase in average income per head was substantial. Yugoslavia, unlike other countries of south-eastern Europe, shows a small population increase, due to the tremendous losses in the war and the epidemics of that period.[1] The rapidity of the rise in income in

[1] Willcox (*American Statistical Journal*, 1928, p. 305) computes war losses in each country as a percentage of all males aged 15-49 in 1913 Yugoslavia heads the list with the appalling figure of 26·7 per cent, Bulgaria and Greece showing only 10·1 per cent and 7·2 per cent respectively. The largest proportionate losses, after Yugoslavia, were shown by Russia and Turkey (15·6 per cent and 15·1 per cent respectively).

this country may be accounted for by the fact that here comparatively rich industrial resources are now beginning to be exploited. Since 1929 the trend of real income per head in Yugoslavia has again been downwards, perhaps due to fresh overpopulation.

On the other hand, in France, Belgium and Austria, which are predominantly industrial countries, the paucity of population increase is associated with a very moderate increase in average real income per hour in spite of the fact that in the two former there has been a considerable transfer of population away from primary production.

In general, and subject to a number of qualifications, this table gives a remarkable confirmation of the *a priori* view that an increase in working population is injurious to economic welfare in a predominantly primary producing country, beneficial to economic welfare in a predominantly industrial country, and that the ill-effects of the former can be mitigated by a rapid transfer of population away from primary production.

The diagrams which follow show the developments in the last thirty years in six of the principal industrial countries in rather a new light. We have obtained a measure of these countries' capacity to produce goods and services, on the assumption that the unemployed, if they were in work, could produce the same value per head as those who are now in work. This assumption is not fully justified, but gives us an approximate idea of the magnitudes involved:

U.S.A.—Data from p. 79 above.

GREAT BRITAIN.—Data from *National Income and Outlay*, with addition for 1937.

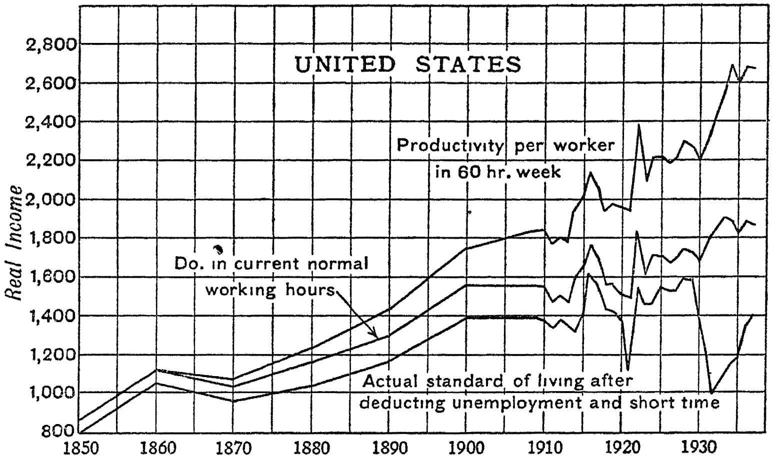
AUSTRALIA.—From *The National Income of Australia.*

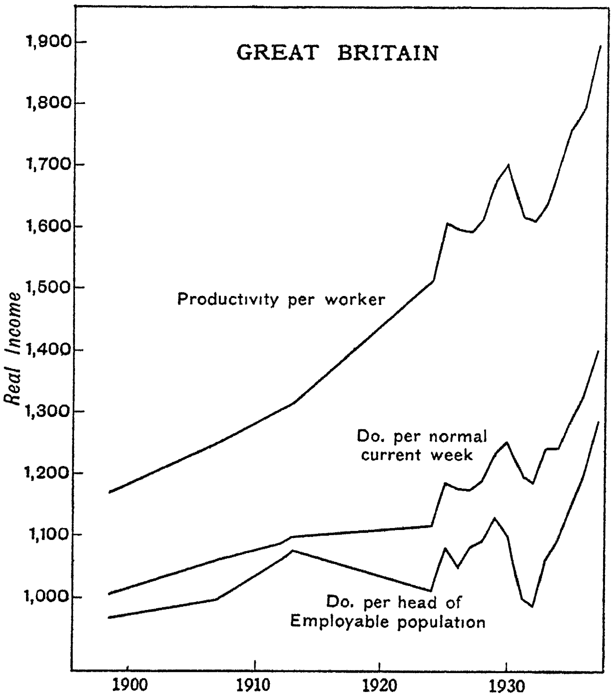
GERMANY.—See pp. 73 and 98 above. In the table there quoted employable population is calculated on the basis of the ratio of employed to total population in each age group at the 1925 Census. On the basis of the ratios found in 1933 the increase would only have been 29 per cent.

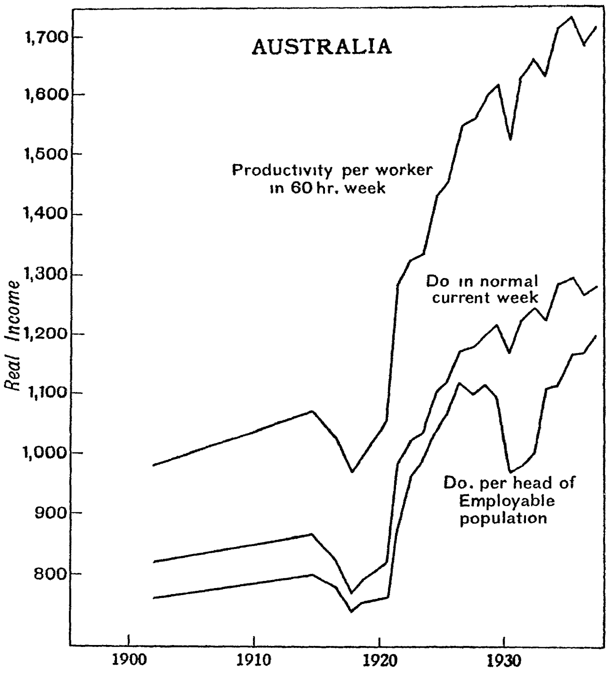
SWEDEN.—See p. 87 above.

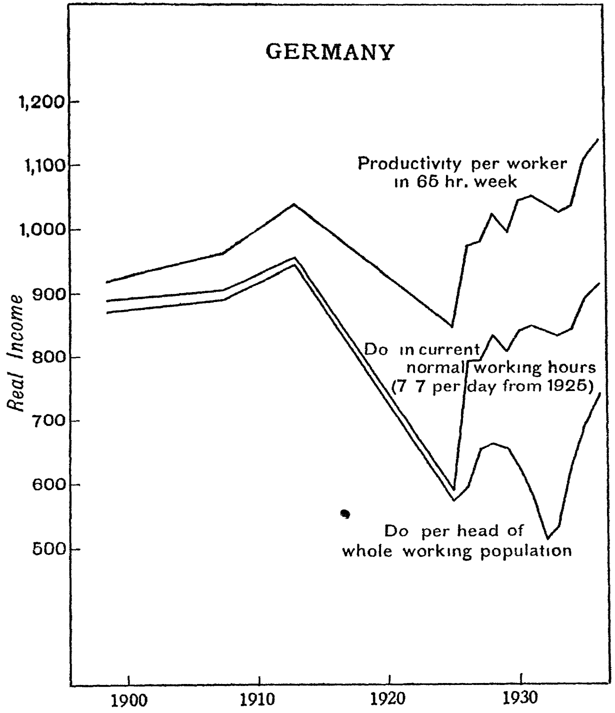
NORWAY —Income data from p. 143 above.

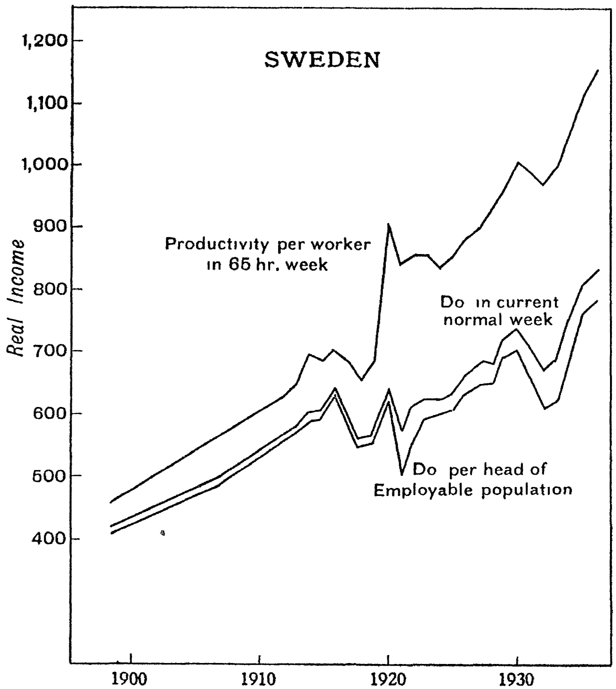
Now if a community enjoys an increase in the average

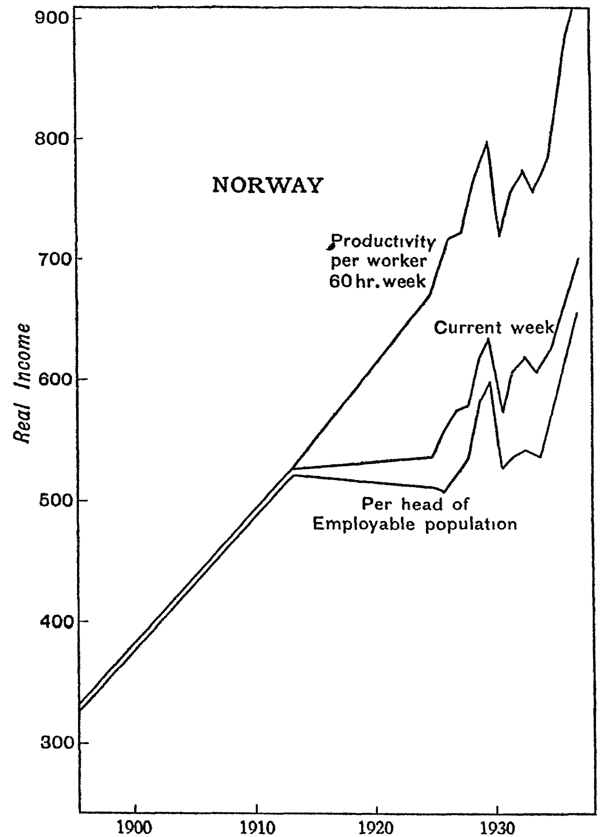

UNITED STATES
Real Income
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
1850
1860
1870
1880
1890
1900
1910
1920
1930
Productivity per worker
in 60 hr. week
Do. in current normal
working hours
Actual standard of living after
deducting unemployment and short time


GREAT BRITAIN
Real Income
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
1900
1910
1920
1930
Productivity per worker
Do. per normal
current week
Do. per head of
Employable population


AUSTRALIA
Real Income
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
1900
1910
1920
1930
Productivity per worker in 60 hr. week
Do in normal current week
Do. per head of Employable population


GERMANY
Real Income
1,200
1,100
1,000
900
800
700
600
500
1900
1910
1920
1930
Productivity per worker in 65 hr. week
Do in current normal working hours (7 7 per day from 1925)
Do per head of whole working population


SWEDEN
Real Income
1,200
1,100
1,000
900
800
700
600
500
400
Productivity per worker
in 65 hr. week
Do in current
normal week
Do per head of
Employable population
1900
1910
1920
1930


NORWAY
Real Income
900
800
700
600
500
400
300
Productivity
per worker
60 hr. week
Current week
Per head of
Employable population
1900
1910
1920
1930

productivity per worker per hour, there are three possible ways in which they may use it. They may use it to shorten the normal working week. They may use it to keep an increased proportion of the working population in unemployment, or in working short time below the current normal working week. Or finally, they may use it actually to increase the quantity of goods and services available per head of the employable population.

A very simple graphical device enables us to read from a single diagram all the data relative to this situation. On the assumption that average output per head of the unemployed, if they were in work, would be the same as of those who are now in work, we can compute what the community would produce if everyone was in work. Making the further assumption that output per week is proportional to the number of hours worked (which again is not entirely true), we can calculate what the community would produce if a longer working week of, say, 60 hours, were still worked.

The curve of production per worker, recalculated to a 60 hours per week basis, therefore gives us a measure of the increase in the community's maximum productive capacity. Next below that is given a curve showing the amount which could be produced in the shorter current normal working week if there were no unemployment. The difference between these two curves represents the amount of potential productivity which has been used up in shortening the working week. Next can be given a curve showing the actual amounts of goods and services produced per head of the employable population. The difference between the third curve and the second will represent the amount of productive capacity wasted in the form of unemployment and short time.

U.S.A.

The conclusions obtained with regard to the U.S.A. are very surprising. The productivity per worker per hour (measured on the top curve and expressed for

convenience in the form of a 65-hour week), which was rising sharply up to 1900, showed very little increase between 1900 and 1914. From that date, however, the increase has been resumed at a faster pace than previously.

Between 1900 and 1925 a considerable part of this increased productivity was used up in the form of shorter working hours. In other words, even if the American population had been fully employed, for the whole current working week, its average standard of living in 1914 or in 1920 would still have been below that which prevailed in 1900. Since 1925 there has been considerable further shortening of hours, but not in proportion to the increase in productivity.

When, however, we turn to the figures of actual standard of living, after allowing for the effects of unemployment and short time, we find that there has been a definite decline. In the boom of 1928–29 the standard of living was slightly lower than had been attained in the previous boom of 1916; while in 1937, which in retrospect is also seen to have been a boom year, the average standard of living per head of the whole occupied population only just reached the level of 1900. In the worst period of the depression, in 1932, the average standard of living fell to a level as low as that of the 1870's, and markedly lower than that of the previous depression of 1921.

One is almost tempted to say that there appears to be some powerful force holding down or even reducing the level of the standard of living actually attained by the American population. The data so far given by no means justify this conclusion, but many economists would be inclined to say on *a priori* grounds that a stage of development may be reached where a strong tendency to save, associated with factors tending to keep the rate of interest above its equilibrium or natural level, may permanently prevent a rise in average real income. If it is possible for such situations to occur, America from 1900 to 1937 certainly looks like an example of one. If

this argument is correct, an interesting corollary is to be drawn from it as follows: It is contended that the average level of realised real income, that is to say the amount of goods and services actually available per head of the working population, cannot rise, for the reasons given. Potential productivity per worker per hour continues to increase. The gap may be filled either by shorter hours or by unemployment, and so far as the *a priori* economic argument goes it seems to make no difference which method we choose of filling the inevitable gap. If this is so, we reach the remarkable conclusion that average real incomes (under these circumstances) cannot be increased, but that hours can be reduced not only to keep pace with increases in productivity, but to absorb existing unemployment.

Great Britain

It is interesting to notice how little the course of development was interrupted by the war, and how in 1924 the curve was taken up again in very much the same position as it would have occupied if it had not been broken in 1914. In the first post-war study of national income, published in 1926 by Professor Bowley and Lord Stamp, it was pointed out that average real income per head in 1924 was about at the pre-war level, and they draw attention to the considerable reduction of hours which had taken place.

We here appear to have a definitely accelerated rate of progress so far as average productivity per worker per hour is concerned. Between 1900 and 1924 there was a great reduction of working hours, and the productivity available for increasing standards of living only increased to a comparatively small extent. Post-war unemployment was at a much higher level than in the years immediately prior to 1913, and realised standards of living in 1924 were below those of 1913, though above those of 1900. After a rise to 1929 there was a heavy fall in the depression, bringing standards

of living again down to below the pre-war level, but from 1932 to 1937 there has been an increase in realised standards of living more marked than in any other country. The situation is of exceptional interest. It remains to be seen whether this upward trend is permanent.

The peculiarity of Great Britain is that average productivity per worker-hour fell during the depression years, while it rose markedly in America and Germany. Figures for France appear to indicate that there was a decline in productivity per worker-hour in that country also. The explanation of this curious phenomenon is probably to be found in the fact that British and French industries resorted to part-time and under-capacity working, which had the effect of reducing the average productivity per worker employed. In Germany and America, where industry is more cartellised, those in control of large industrial concerns probably found it more profitable to close down certain units altogether and to concentrate production on certain plants running at comparatively full capacity. As the plants closed down would only be those with the lowest productivity per worker, the effect of this policy would be to raise productivity per worker-hour and also to intensify unemployment, while productivity per worker-hour should fall during periods of recovery. There are indications in both German and American figures that this is the case.

Germany

Prior to 1913 there was evidence that German productivity was increasing at an accelerated rate. Some reductions in working hours were being made, although full data are difficult to obtain. The combined effects on productivity of the war, economic clauses of the peace treaties, the invasion of the Ruhr in 1923 and the inflation are shown in the very low level of the 1925 figures. In spite of the low level of productivity, working hours had been greatly reduced, and realised standards of

living in 1925 were far below those of the pre-war years — indeed it was right back at the level of the 1870's. In that year there was virtually no unemployment.

Equally interesting is the exceedingly rapid recovery in productivity between 1925 and 1926. This recovery was accompanied by a financial crisis, and indeed, as the diagram shows, was largely wasted in the form of unemployment. In 1927 and 1928 there was a certain recovery in realised standards of living, but they remained far below the level of potential productivity and unemployment was very high. With the onset of the depression, unemployment became exceptionally severe, even if measured on the basis of the lower employable population estimated for more recent years, and the realised standard of living was carried down to hitherto unplumbed depths. The recovery between 1932 and 1936, though steady, still left the figures far below the pre-war standard of living. Between 1936 and 1937 there was a further marked reduction of unemployment, but only a slight further increase in productivity. The increase in productivity between 1913 and 1937 has apparently only been barely sufficient to provide for the reduction in the length of the average working day.

Australia

In this case we have data extending back to the year 1886. We have the remarkable feature of a very rapid growth of real income between 1886 and 1898 followed by a definite recession. Not until 1920 was the 1898 level of real income per head recovered. This can probably be explained by the succession of droughts, financial crises and labour disputes which occurred in the 1890's, though probably the deterioration of pastures due to overstocking in the 1880's was an important factor. From 1920 to 1926 was another period of exceedingly rapid advance, followed again by a period of comparatively slow progress.

The effect of the depression on productivity was

short-lived, but the effect of unemployment in reducing realised standards of living is clearly marked. The unique feature in this case is that unemployment during the period of rapid expansion (1920–26) was definitely less than in the period of slow growth between 1901 and 1914, and appears now in 1937 to be no higher than it was at the beginning of the century. The result is that the greater part of the increase in productivity has been actually realised in the form of shorter working hours and increasing standards of living, and the 1937 standard of living is much above anything previously obtained.

The period of stagnation between 1926 and 1929 in which realised standards of living fell and unemployment rose in spite of increasing productivity, is also worthy of note.

Sweden

Up to the 1870's growth appears to have been rapid, and from that date to have slowed down temporarily. From 1890 onwards growth has again been rapid and, taking the long view, continued from 1890 to 1936. The average rate of growth is 31 per cent per decade. It is most interesting to notice how the check to Swedish economic development in the years 1914–19 was compensated by the violent rise in 1920–21, followed by some years of stagnation before the upward movement was resumed in 1925. The acceleration of the rate of growth shown about 1890 is rather obscured in the original figures, owing to the fact that from that date onward there were considerable reductions in working hours not taken into account in the figures of average income per head as published.

Like Great Britain, this country also now shows evidence of an accelerating rate of progress. The depression of 1931–33 definitely reduced productivity per worker-hour, but this reduction was rapidly made good in later years. The effects of the war on productivity were very marked; but at the same time this damage

had been fully repaired by 1920. Between 1914 and 1920 there was a very great reduction of working hours, which prevented the realised standard of living from recovering its pre-war level until 1926. In Sweden there appears to be no permanent tendency for unemployment to rob the community of the fruits of increasing productivity. Apart from some intensification of unemployment during the depression, realised standards of living have followed fairly closely below the maximum dictated in changes of productivity and working hours, and again are much greater now than at any previous period.

Norway

In this country there is evidence of rapidly accelerating increase in productivity with a bad set-back between 1930 and 1935. Changing terms of trade may have had a distinct effect on the real income per head in this country. The combined effect of shorter working hours and increased unemployment kept achieved standards of living, until 1934, at about the 1913 level.

Over periods for which figures of real income are not available, some idea of the extent and direction of economic progress can be obtained from figures of real wages. The most far-reaching calculation in this direction is one based on data collected by F. B. Jevons [1] relating to the standard of living in ancient Athens as compared with the present day. At the time of the erection of a temple at Eleusis in 328 B.C., unusually complete records happen to have been preserved of the wages paid to the free labourers engaged on the work, and also of the retail prices of numbers of necessaries of life. It happens that for some reason the erection of this temple was mainly undertaken by free labour rather than by slave labour, and for that reason the wages may

[1] *Economic Journal*, 1896, p. 470. Original data from *Corpus Inscriptionum Atticarum.*

be taken as indicative of the standard of living of the whole free population. The unit of coinage was the drachma of 9 obols, the drachma containing 67·5 grains of silver and worth about 3·2d. sterling at the average of silver prices over the last decade. How far the purchasing power of silver over other goods and services was different then from what it is now will be seen shortly.

Jevons quotes the wages of unskilled labourers at $1\frac{1}{2}$ drachmae per day, of tilers and masons at 2 drachmae and of brickmakers at $2\frac{1}{2}$ drachmae. In the table below, these are recalculated as yearly figures on the assumption that the worker had 300 days' work per year. Sundays of course were not known; but it would appear that a number of days would not be worked owing to holidays, religious ceremonies, sitting on juries,[1] and the performance of other public duties, while unemployment was not unknown. Corresponding figures are calculated for the modern English builder's labourer and bricklayer. It is hard to see why the brickmaker enjoyed a considerable premium over the wages of skilled building workers, as in the modern world his wage approximates to that of the labourer.

Wheat prices are quoted by the *medimnus* amounting to about $1\frac{1}{2}$ English bushels, or 90 lb. Jevons quotes a figure currently used as a basis of estimation of rations for slaves, of $\frac{1}{48}$th of a medimnus per head per day. This corresponds to about 300 kilograms of bread-stuffs per head per year, which is considerably higher than that found at present in any part of the world for which we have statistics. It is reasonable to suppose, however, that a comparatively large ration of bread would be needed if the diet was lacking in other foodstuffs, as was probably the case. A rather flimsily constructed bungalow, inhabited by a manual wage-earner, could be bought for 450 drachmae, or rented at 45 drachmae a year. The rate of interest at that time, judging from quotations in the speeches of Demosthenes and

[1] If Aristophanes is any guide.

elsewhere, is believed to have been over 10 per cent, and if this annual rental had to cover maintenance as well as interest, it appears to be low. However, we may accept Jevons's figure as it stands. He also quotes the price of a pair of boots, a straw hat, a leather working coat and a *himation*, or long tunic made of wool or linen (presumably of thick and expensive fabric).

In the following table a comparison is made between wages and cost of living in drachmae in ancient Athens, with the corresponding figures for modern England. In the case of wheat and silver, where prices have fluctuated considerably, the average of the decade 1925–34 is taken. It is assumed that the wage-earner has two dependents and that their wheat consumption is $\frac{1}{48}$th of a medimnus per day, as indicated above. The cheapest type of small bungalow in England now costs about £250, and that, or a tenement of corresponding size and comfort, can be rented for £25 per year. The corresponding modern figure for the price of a *himation* is difficult to estimate. It is presumed that it was made of material corresponding in thickness nearly to that of the modern overcoat.

The English wage figures are on the assumption of 50 weeks' work in the year.

	Drachmae	£	Drachmae to £1
22·8 medimni of Wheat .	114	9·2	12·4
Rent of bungalow . .	45	25	1·8
Two *himatia*	37	8	4·6
Two leather coats . .	9	4	2·25
Three pairs boots . .	18	2·25	8·0
Six straw hats . . .	1·3	0·3	4·3
	224·3	48·75	4·6
Based on value of silver content of drachma . .	..	..	75·0
Yearly wage, labourer . .	450	133	..
,, ,, tiler and mason (bricklayer) .	600	176	..
,, ,, brickmaker .	750	..	..

NUMBER OF ABOVE BUDGETS PURCHASABLE WITH YEAR'S WAGE

	Ancient Athens	Britain
Labourer	2·0	2·73
Bricklayer or mason	2·68	3·61
Brickmaker	3·35	3·0

It appears, therefore, that the drachma had a purchasing power, over the necessaries of life, of about 4s. 4d., and the obol of about 6d. The difference between the standards of living of the free wage-earner in ancient Athens and the modern British wage-earner, *measured by the purchasing power of their wages over the necessaries of life*, is not very marked; and in fact about corresponds to the difference between the labourer and the skilled worker today. So far as the non-necessaries go (and it appears that in both cases the wage-earner was in a position to devote a considerable fraction of his wage to the purchase of non-necessaries) it is very difficult to judge. Of course, the modern wage-earner can purchase many goods and services which were unobtainable at that time. On the other hand, many goods and services may have been available then which can now only be obtained at a very high price (including, for example, pottery, theatres and wines), and no judgment can be made.

Of particular interest is the comparison of the relative purchasing powers of the ancient drachma and the modern pound in different directions. Where the ratio is low, as in the case of rents, this may be taken as an indication that the amount of labour required to produce a house is now almost as great as it was then, whereas in other fields, such as the production of boots, the amount of labour now required is considerably less. In the case of wheat there has been a very marked reduction in the relative cost in terms of other goods, that is to say in the amount of labour required to produce a bushel of wheat. But most marked reduction of all has been in the cost of producing silver.

These rough calculations may at any rate serve as

a warning against attempting to measure the purchasing power of money in ancient times on the basis of its silver content, or even on the basis of its purchasing power over wheat. Owing to the lack of co-operation between classicists and economists, very little work has hitherto been done in this direction, but it is certainly to be hoped that more will be done in the future. There appears to be some evidence for the belief that, so far as economic advancement was concerned, the world has only comparatively recently got back to the level which was enjoyed by, at any rate, the free half of the population in classical times.

Leaping now from the fourth century B.C. to the Middle Ages, we can draw some conclusions about standards of living in mediaeval England from the great mass of material assembled by Thorold Rogers in *Six Centuries of Work and Wages*. For purposes of comparison of real wages we may use some summaries of Rogers's results prepared by Steffen.[1] Significant periods are 1401–1520, throughout which the standard of living appears to have been stable, and 1593–1662, during which it was generally declining. These are compared with 1688, for which year we have Gregory King's estimate of national income and consumption. The weighting of the commodities is given by Gregory King's figures of consumption.

Though the margin of uncertainty is very wide, it certainly appears to be substantiated that the average of real wages is just as capable of falling over long periods as it is of progressing. Average real income per head in fifteenth-century England may well have been higher than the 279 international units by which we measured its value for 1688, and there is considerable evidence below of a further disastrous decline between 1688 and the early years of the nineteenth century.

For the nineteenth century prior to 1860 little information is available. But Professor Bowley's figures[2] of the wages of agricultural labourers (who

[1] *The Nineteenth Century*, June 1893.

[2] *J.R.S.S.*, 1898, p. 206.

then formed the largest part of the working population) go to confirm our conclusions drawn from national

	1688	1593–1662	1401–1520
Prices of foodstuffs— (Pence per head per week with 1688 quantities)			
Flour or wheat . .	3 61	4 90	0 65
Meat . . .	3 29	4 27	0 75
Butter and cheese . .	1·94	1 78	0 34
Fish and eggs . .	0 90	0 89	0 17
Fruit and vegetables	1·00	0 36	0·06
Total . .	10 74	12 20	1 97
Average wages, pence per day—			
Carpenter	22·6	14·3	5 6
Agricultural labourer . .	14 4	10·1	3 25
Index figures 1688 = 100—			
Wages (unweighted average) .	100	66 4	23·6
Prices . . .	100	113·4	18 3
Real Wages	100	58·5	129

income figures. Roughly reducing money wages to real wages by use of the Sauerbeck and Jevons's index numbers, and taking 1860–69 as the base period, we have :

Average Weekly Wages, England			Average Weekly Wages, Ireland			Average Number of Weeks' Work per Year obtained by Irish Agricultural Labourers	
Years	Money	Real	Years	Money	Real		
	s. d.	s. d.		s. d.	s. d.		
1800	8 11	5 3	1801–10	5 1	3 2	1777	52
1824	9 7	9 2	1829	5 1	5 4	1800	42
1833	10 8	11 10	1833–40	4 6	4 6	1829	31
1837	10 3	10 2	1845	4 8	5 4	1837–50	26
1850	9 6	12 4	1850	4 10	6 3	1862	31
1860–69	12 0	12 0	1860–69	7 6	7 6	1870	35
						1880	40
						1886	46
						1893	52

For an important section of the population, therefore, standards of living at the beginning of the nineteenth century were not much more than 40 per cent of the very modest standards of 1860–69 : particularly the

depths of economic degradation to which Ireland had been reduced, with widespread unemployment on top of a starvation wage, require to be remembered.

It is indeed true to say that in the early years of the nineteenth century—

> When Britain set the world ablaze
> In good King George's glorious days

—the population of the British Isles was living at what we now call an Asiatic standard of living, with the population of Ireland on the edge of famine.

The situation in Ireland in the early nineteenth century was Malthusian in that it represented the pressure of a rapidly growing population, deprived of all possibilities of industrial development, upon limited means of subsistence. The situation was only resolved by a wholesale outflow of population, which, in the course of a century, raised Ireland from the poorest to one of the richest countries of Europe. The *modus operandi* of Malthusianism-reversed, as this process may be called, was the transformation of Irish agriculture from a cereal to a livestock economy, for which the country was better suited by climate, but which was only possible with a low density of population. An interesting illustration of this [1] is to be found in the fact that those counties where the population decline was most rapid during this period, showed the most rapid percentage increase in the number of cattle, with a high degree of correlation.

An interesting survey, though approximate in many details, of real wage movements in several countries in the nineteenth century was made by Professor Bowley in 1898.[2]

Based on 1891, he finds that in Britain, U.S.A. and France the rise in real wages in the course of forty years was almost exactly the same, namely about 85 per cent.

[1] Privately communicated by Mr. Geary, Statistical Department, Dublin.
[2] *Economic Journal*, 1898, p. 488.

For Germany he was unable to calculate a figure, owing to the fragmentary nature of the price data then available.

REAL WAGES ON 1891 BASE

	U S A.	Great Britain	France
1844–53	54	53	55
1854–63	53	51	61
1864–73	57	59	67
1874–83	76	82	78
1884–93	95	97	94

An interesting series for Australia was calculated by Sir Timothy Coghlan.[1] Taking the period 1893–98 as his base, he gives the following result for the growth of real wages :

1821–37	52	1859–62	74
1838–42	59	1863–72	89
1843–52	57	1873–92	103
1853–58	97	1893–98	100

The astonishing rise between the 1840's and the 1850's was of course due to the discovery of gold in Victoria in 1851. The rise of 70 per cent in real wages represented a rise of 210 per cent in money wages and of 82 per cent in prices. In the subsequent period 1859–1862 money wages fell by 33 per cent but remained at more than twice the level of 1843–52. The decline in real wages between the 1880's and 1890's is consistent with data previously calculated about the rate of growth of national income.

The only other country on which it is possible to throw some light by the use of real-wage statistics is Belgium. National income data are not available for years earlier than 1913, but a real-wage calculation has already been quoted [2] to show that there was a $17\frac{1}{2}$ per cent rise in real wages between 1891 and 1928. During this period, however, there had also been a 20 per cent

[1] *Wealth and Progress of New South Wales.*
[2] See p. 139 above.

reduction of hours. Between 1880 and 1895, however,[1] there appears to have been a 13 per cent rise in the average wage level of agricultural and industrial workers taken together, accompanied by a 21 per cent fall in retail prices (between 1882 and 1895). Part of this increase was due to the transfer of agricultural workers to industry. Agricultural workers were 46 per cent of the working population in 1880 and only 31 per cent in 1896; their wages throughout were much lower than those of industrial workers. Dechesne[2] sets out to calculate agricultural and industrial real wages in Belgium measured at 1867–77 prices. From 1850 to the 1880's, taking the period 1880–84 as a base, he finds that in the 1850's agricultural real wages were only 47 per cent of those in 1880–84 and industrial wages 70 per cent. He is quoting figures calculated by Denis and it is difficult to gauge their validity.

APPENDIX

ORIGINAL NATIONAL INCOME DATA FOR RECENT YEARS

(For Countries where not shown in Tables)

Australia

INCOME PRODUCED BEFORE DEDUCTION OF EXTERNAL INTEREST PAYMENTS

Years ended 30th June	£ million	Years ended 30th June	£ million
1921–22	540	1930–31	566
1922–23	584	1931–32	528
1923–24	628	1932–33	550
1924–25	677	1933–34	609
1925–26	692	1934–35	632
1926–27	731	1935–36	704
1927–28	747	1936–37	774
1928–29	768	1937–38	814
1929–30	730		

[1] Mahaim, *Journal of the Royal Statistical Society*, 1904, p. 430.
[2] In *La Productivité du Travail et les Salaires*.

Austria

TAXABLE INCOMES, ESTIMATED TO BE 80 PER CENT OF NATIONAL INCOME, I.f.K., 6TH APRIL 1938

Year	Million Schillings	Year	Million Schillings
1930	5926	1933	4293
1931	5632	1934	4337
1932	4839		

New Zealand

INCOME PRODUCED AFTER DEDUCTION OF EXTERNAL INTEREST PAYMENTS

Years ended 31st March	£ million	Years ended 31st March	£ million
1925–26	153·9	1932–33	130·0
1926–27	154·1	1933–34	147·6
1927–28	168·5	1934–35	152·5
1928–29	176·7	1935–36	168·0
1929–30	171·2	1936–37	197·8
1930–31	152·6	1937–38	215·0
1931–32	135 5		

Bulgaria

TCHAKALOFF, MEMORANDUM BY INSTITUTE FOR ECONOMIC RESEARCH, SOFIA UNIVERSITY

Year	Milliard Leva	Year	Milliard Leva
1926	46.4*	1932	39·2
1928	56·5	1933	35·6
1929	56·2	1934	34·6
1930	48·6	1935	36·6
1931	44·6		

* Quoted in *Tax Systems of the World.*

Great Britain

GROSS NATIONAL INCOME INCLUDING DEPRECIATION AND MAINTENANCE (ABOUT £400 MILLIONS A YEAR) AND INDIRECT TAXATION

Year	Gross National Income	Indirect Taxation included
1924	4376	486
1925	4710	495
1926	4526	511
1927	4719	530
1928	4710	537
1929	4765	515
1930	4698	501
1931	4264	506
1932	4210	541
1933	4334	546
1934	4712	556
1935	5028	578
1936	5341	607
1937	5760	632
1938 (on basis first half-year)	5848	632

Greece

Year	Milliard Drachmae
1929	34·7

Poland

MEMORANDUM BY THE SLAVONIC DEPARTMENT, BIRMINGHAM UNIVERSITY: NATIONAL INCOME INCLUDING FARM CONSUMPTION AT RETAIL PRICES

Year	Milliard Zloty	Year	Milliard Zloty
1929	26·0	1933 at 1929 prices	19·5
1933	13 3	1937 at 1929 prices	23·4

Roumania

Year	Milliard Lei	
1926	168	National Bank of Roumania, *Bulletin*, July 1930
1927	159·5	
1928	185	
1929	201	League of Nations
1930	150	
1931	110	
1932	103 5	
1933	99·3	

FIGURES GIVEN BY PROFESSOR LINDAHL

Year	Norway, million Krone	Denmark, million Krone	Finland, million Marks	Holland, million Guilders	Belgium, million Francs	Italy, million Lire
1925	3300	4100	..	5200	31,000	100,000
1926	2800	3700	17,000	5202	..	120,000
1927	2600	3500	..	5316	48,610	..
1928	2500	3500	19,000	5683	..	94,000
1929	2600	3700	16,350	6767	.	..
1930	2600	3750	..	5405	66,400	..
1931	2200	3550	14,000	4710	..	..
1932	2200	3400	13,870 *	4013	.	..
1933	2200	3550	15,180	3821	..	.
1934	2200	..	16,500	3582	.	65,000

* Quoted in *Tax Systems of the World*

CHAPTER V

THE FLOW OF LABOUR TO TERTIARY PRODUCTION

In Chapter II were examined, for a single period of time, the comparative levels of economic advancement which had been obtained by the different countries of the world, and it was shown that the widest discrepancies prevailed between them. Next was measured the rate of progress in different countries, expressing the data as far as possible in terms of the same international units, so that it was possible to judge how far the different economic systems of the world were tending to reach some level of prosperity, which were overtaking, and which were falling behind. It was found that rates of economic progress, like the absolute levels of prosperity, differed exceedingly widely. There was evidence of actual economic decline, or at any rate complete absence of progress, in many of the agricultural countries of the world. In the industrial countries there was a general upward tendency, progress being rapid in some cases and slow in others.

We may well now turn to examine what much careful generalisation of available facts shows to be the most important concomitant of economic progress, namely the movement of working population from agriculture to manufacture, and from manufacture to commerce and services.

In 1691 Sir William Petty wrote, "There is much more to be gained by *Manufacture* than *Husbandry*; and by *Merchandise* than *Manufacture*. . . . Now here we may take notice that as Trades and Curious Arts increase; so the Trade of Husbandry will decrease, or else the wages of Husbandmen must rise and consequently the Rents of Lands must fall." Commenting on the high level of income per head in Holland at that date as compared with other European countries, he

shows that this is associated with the employment of a large proportion of the Dutch population in manufacture and commerce. In England, he points out, the wages of a husbandman at that time were four shillings a week while a seaman's wages were as much as twelve shillings a week. "So as a Seaman is in effect three Husbandmen, wherefore there is little Ploughing and Sowing of Corn in Holland and Zealand, or breeding of young Cattle", a considerable proportion of Dutch food supplies being obtained by importation.

It is sufficient to say that the vast majority of the world still remains quite unaware of the significance of Petty's brilliant and entirely correct generalisation made from the scanty facts at his disposal in 1691; and, which is much more serious, the great majority of economists and those concerned with economic policy still act as if they too were entirely unaware of what might be called, in all fairness, Petty's Law.

Once again we can draw our conclusions either from an examination of the present-day situation in different countries, or from examining figures in each country over a series of years. Beginning with the former treatment, we can show that the different levels of economic advancement are very closely associated with the proportions in which the working population is distributed. The following table (page 179) shows these facts for the most recent years available:

U.S.A.—Data refer to persons engaged in work, excluding unemployed, in 1935, as given in *National Income in the United States, 1929–35*, p. 33. Work relief employees are included under "Construction". The total of 2,070,000 given in "Miscellaneous" are subdivided into 50,000 fishermen, 1,000,000 engaged in small manufacturing and building handicraft, and 1,020,000 in services. 300,000 postal workers are transferred from "Government" to "Communication" and 50,000 lumbermen from "Manufacture" to "Primary". The unpaid family labour on farms, estimated to amount to three and a quarter millions, is excluded here, but is included in the historical comparisons and accounts for the difference in the proportions shown.

CANADA.—1931 Census, omitting unemployed and " unspecified ".

GREAT BRITAIN.—Population in work as shown by 1931 Census.

SWITZERLAND.—1930 Census. Analysis prepared by *I.L.R.* vol. 34, p. 813.

AUSTRALIA.—Numbers in work at the 1933 Census.

NEW ZEALAND.—1936 Census. Preliminary results in *Monthly Abstract of Statistics*, March 1938.

HOLLAND.—1930 Census. Analysis prepared by *I.L.R.* vol. 29, p. 412.

ARGENTINE —From *Statistisches Handbuch der Weltwirtschaft.*

Mining in this case is included in primary industry.

EIRE.—1926 Census.

FRANCE.—1931 Census. Analysis prepared by *I.L R.* vol. 33, p. 878. Unemployed excluded, and also 3,194,000 females included under agriculture.

DENMARK.—1930 Census. Analysis prepared by *I.L.R.* Part II, 1937.

SWEDEN —1930 Census.

GERMANY —1933 Census, omitting unemployed and female " Mithelfende Familienangehörige " in agriculture (working members of peasant families).

BELGIUM.—1930 Census. Analysis prepared by *I.L.R.* vol. 34, p. 809.

CHILI.—1930 Census. Analysis prepared by *I.L.R.* vol. 29, p. 823.

NORWAY.—1930 Census. Analysis prepared by *I.L.R.* vol. 31, p. 903.

AUSTRIA.—1934 Census. Analysis prepared by *I.L.R.* vol. 33, p. 873. 330,000 women engaged in agriculture excluded.

CZECHOSLOVAKIA —1930 Census. Analysis prepared by *I.L.R.* February 1937. " Other and Unknown " excluded from analysis.

HUNGARY.—1930 Census. Analysis prepared by *I L.R.* vol. 33, p. 269. " Day Labourers " distributed between agriculture and industry.

JAPAN.—1930 Census. Analysis prepared by *I.L.R.* vol. 31, p. 439. 6·4 million females engaged in agriculture excluded.

ESTONIA —1934 Census. Analysis prepared by *I.L.R.* vol. 33, p. 263.

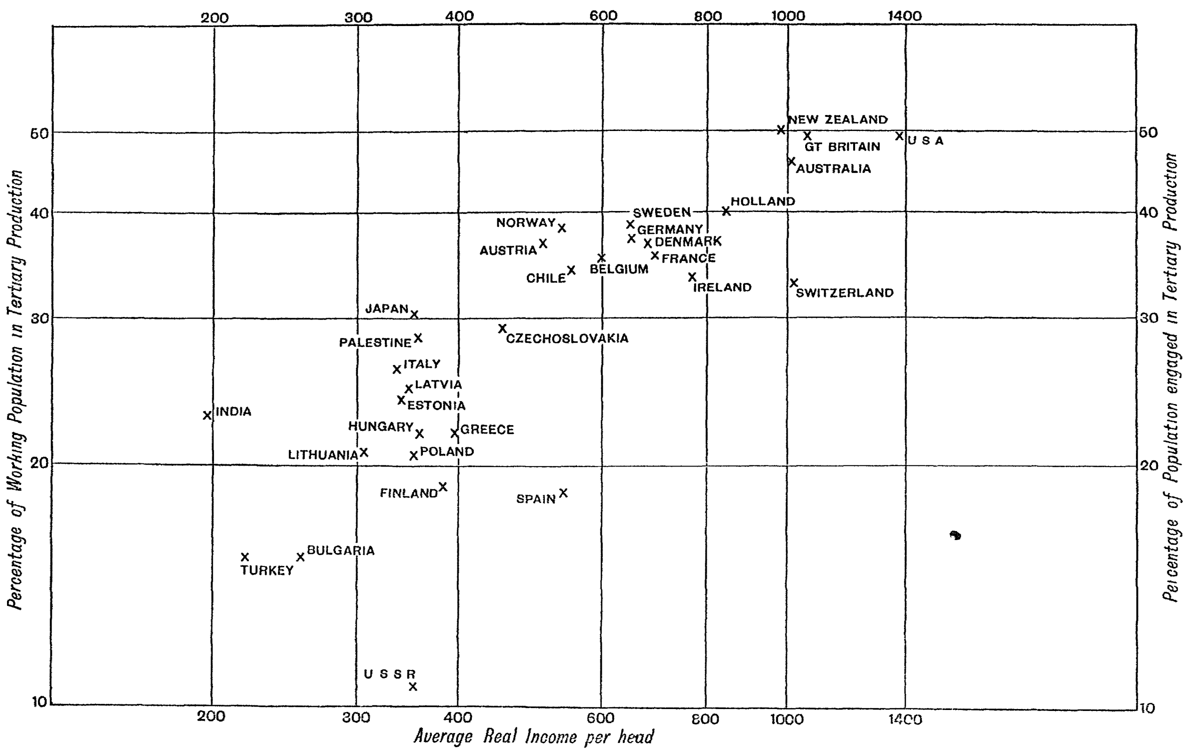
ITALY.—1931 Census. Analysis prepared by *I.L.R.* vol. 31, p. 897. One and a half million females engaged in agriculture excluded. Also 208,000 unemployed in agriculture and 712,000 unemployed in industry (figures from *I.L.O. Year Book*).

PALESTINE.—1931 Census. Analysis prepared by *I.L.R.* vol. 31, p. 443.

INDIA.—1931 Census. Analysis prepared by *I.L R.* vol. 31, p. 437. Excluding 32 million females engaged in agriculture.

	Average Real Income per Head, 1925–34	Primary	Secondary	Tertiary	Included in Tertiary					
		Agriculture, Forestry, Fishing	Mining, Building Industry	Commerce, Transport and Services	Transport and Communications	Commerce and Finance	Forces	Other Government Services	Other Services	Including Domestic Service
U.S.A.	1368	19·3	31·1	49·6	7·7	16·2	0·3	7·8	17·6	4·6
Canada	1337	34·5	23·2	42·3	7·9	13·1	0·2	3·0	18·0	4·3
New Zealand	1202	27·1	24·2	48·7	9·6	15·4	0·3	23·4		
Great Britain	1069	6·4	43·9	49·7	8·2	16·7	1·0	6·0	17·8	8·1
Switzerland	1018	21·3	44·9	32·8	4·4	9·8	0·2	1·2	18·2 ‡	7·2
Argentine	1000 approx.	22·6	43·0	34·4	.	.				..
Australia	980	24·4	29·4	46·2	8·8	17·8	0·4	3·4	15·8	4·9
Holland	855	20·8	39·2	40·0	9·4	14·1	0·4	16·0		7·7
Ireland	770	53·4	13·1	33·5	4·2	9·3	1·3	3·9	14·8	7·0
France	684	25·0	39·7	35·3	5·5	14·7	2·3	4·4	8·4	.
Denmark	680	35·7	27·5	36·8	5·9	12·5	0·4	0·7	17·3	.
Sweden	653	32·3	29·2	38·5	4·0	9·0	0·6	24·9		.
Germany	649	24·3	38·5	37·2	5·8	13·1	0·5	3·0	14·8	4·7
Spain	628	57·0	24·6	18·4	8·1		2·1	8·2		.
Belgium	600	17·1	47·8	35·1	6·9	14·6	1·8	2·7	8·7	..
Chile	550	37·9	27·9	34·2	5·2	11·1	1·6	3·6	12·7	7·2
Norway	539	35·3	26·5	38·2	9·3 †	12·5	0·3	1·3	14·8	10·3
Austria	572	24·5	38·6	36·9	5·3	13·9 *	1·1	16·6		
Czechoslovakia	455	27·3	43·6	29·1	5·0	9·9	2·8	11·4		
Greece	397	44·2	33·9	21·9	14·1		0·5	7·3		
Finland	380	51·0	30·4	18·6	10·4		0·6	7·5		
Hungary	359	54·1	24·8	21·8	3·0	5·9	0·9	12·0		4·6
Japan	353	50·3	19·5	30·2	3·2	17·0	.	.	10·0	2·8
Poland	352	61·6	18·0	20·3	9·1		4·2	7·0		
Latvia	345	52·0	23·6	24·4	11·7		2·7	10·0		.
Italy	343	42·9	31·1	26·0	5·2	9·7	0·5	10·6		3·6
Estonia	341	51·6	24·3	24·1	4·0	6·7	2·9	10·4		3·9
Palestine	.	52·6	17·9	28·5	6·2	10·1 *	3·9	.	8·9	3·9
U.S.S.R.	285	74·1	15·4	10·5	5·0		1·3	4·3		
Bulgaria	284	67·3	17·4	15·3	7·2		1·3	6·8		.
Lithuania	207	64·5	15·0	20·5	5·6		2·8	12·2		.
Turkey		73·1	11·5	15·4	7·4		4·4	3·5		.
India	110	62·4	14·4	23·2	2·1	7·3	1·7		12·1	10·0

* Including catering and hotels.
† 3·0 of these are engaged in shipping mainly in non-Norwegian trade
‡ 4·8 of these in hotels


200
300
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NEW ZEALAND
GT BRITAIN
U S A
AUSTRALIA
HOLLAND
SWEDEN
GERMANY
DENMARK
FRANCE
IRELAND
SWITZERLAND
NORWAY
AUSTRIA
CHILE
BELGIUM
JAPAN
PALESTINE
CZECHOSLOVAKIA
ITALY
LATVIA
ESTONIA
INDIA
HUNGARY
GREECE
LITHUANIA
POLAND
FINLAND
SPAIN
BULGARIA
TURKEY
U S S R
Percentage of Working Population in Tertiary Production
Percentage of Population engaged in Tertiary Production
Average Real Income per head

All other countries from analysis prepared by *Statistisches Jahrbuch für das Deutsche Reich*, 1936, International Section, p. 35. Census dates: Spain 1920, Greece 1928, Finland 1930, Russia 1926, Latvia 1925, Bulgaria 1926, Lithuania 1923, Turkey 1927. Females engaged in agriculture excluded from Bulgarian figures. Polish data from *National Income of Poland* (published by Birmingham University, 1937) relating to 1921.

The compilers of the *International Labour Review* and of the *German Statistical Year Book* have endeavoured as far as possible to systematise the Census returns from all countries, and their conventions have been adopted in examining original census returns of the larger countries for the purpose of compiling this table. "Agriculture" includes forestry, fishing and hunting. "Industry" includes mining, building and public works, gas and electricity supply.

The principal source of discrepancy between the Census returns is the very varying statistical treatment of women members of peasant families. In France and Germany, for instance, practically every woman member of a peasant family is regarded as being engaged in agriculture, whereas in U.S.A. and Denmark only women wage-earners are included. It is desirable to adopt the later convention, and where wage-workers can be distinguished from unpaid members of peasant families, as in Germany, this is done Otherwise it is sometimes necessary to exclude all families recorded under the heading of "Agriculture".

Analysis of this nature can be made either by "Industry" or "Occupation" "Occupation" refers to the type of work on which a man or woman is actually engaged, while "Industry" refers to the trade or service performed by his employer, which may be very different. In most countries now both occupational and industrial analyses are prepared, and where both are available the industrial analysis is quoted. In most countries, e.g. U.S.A. and Australia, detailed figures are only available by occupations, and that classification is made by broad industrial groups. For the earlier years, and for some of the smaller countries at the present time, occupational analyses alone are available. For detailed work these are no substitute for industrial analyses, but for broad figures of the type quoted in this table differences are generally seen not to be very great.

Making a "horizontal" analysis between a number of countries of the world at the same time, we find that Sir William Petty's law is fulfilled to a remarkable degree. We shall later find that it is also fulfilled when we make

"vertical" comparisons for one country at succeeding dates.

For convenience in international comparisons production may be defined as primary, secondary and tertiary. Under the former we include agricultural and pastoral production, fishing, forestry and hunting. Mining is more properly included with secondary production, covering manufacture, building construction and public works, gas and electricity supply. Tertiary production is defined by difference as consisting of all other economic activities, the principal of which are distribution, transport, public administration, domestic service and all other activities producing a non-material output. The highest ratio of tertiary producers to occupied population is shown by Great Britain and U.S.A., where the figure was 50 per cent. Almost equally high figures are shown by New Zealand and Australia. The countries in which 50 per cent or more of the occupied population are engaged in primary production are all (with the exception of Spain, where the figures are dubious) found at the lower end of the list. Furthermore, no country whose average income per head is below 400 units fails to show that at least 40 per cent of its population engaged in primary production, with the exception of Japan, where the proportion engaged in tertiary production is inexplicably high. It is remarkable that Denmark, New Zealand, Holland, Switzerland and Australia with large export trades in primary produce, should show such low proportions of the population engaged in primary production. The figures indicate that, under the circumstances of these countries, a small fraction of the population is able to supply the country's entire needs of primary produce and leave a considerable surplus for export. By far the smallest ratio of primary producers to occupied population is found in Great Britain. Nevertheless even in this case the country only has to import about half of its requirements of foodstuffs. Allowing for non-food primary produce such as wool, timber, etc., one can still see, however, that 6 per cent

of the British population produce nearly a third of the country's requirements of primary produce. The low figures for France, Germany and Belgium will also cause surprise.

In the case of secondary production some unexpected features are also brought to light. The most industrialised country, in the sense of the country where the highest proportion of the population is engaged in secondary production, is Belgium, with 47·8 per cent, followed by Switzerland with 44·9 per cent. Great Britain is third. Among the richer countries, however, there is apparently a tendency for the proportion engaged in secondary production to fall while the proportion engaged in tertiary production rises. Thus France, Poland, Germany, Austria, Czechoslovakia and Greece all have a higher proportion of their population engaged in secondary production than the U.S.A.

Turning to the more detailed figures available under some of the sub-headings to tertiary production, some interesting figures are brought to light. In the case of transport, New Zealand is apparently the country with the greatest burden of transport costs, having to devote 9·6 per cent of her labour force to this purpose. High figures in this field are also shown by Holland, Australia and Great Britain. Few would have expected that Holland and Great Britain, with their highly compact populations, would have had to employ a greater proportion of their population in transport than the U.S.A. Australia has the dubious distinction of having one of the highest proportions of population engaged in commerce and finance; the country showing the highest ratio here being, very unexpectedly, Japan. Great Britain has a slightly higher proportion than the U.S.A. Sixteen per cent of the American population live by selling things to each other, and the proportion is the same in many other countries. Ireland, Switzerland and Sweden, with a high standard of living, have a comparatively low proportion of the population engaged in commerce.

Quite an interesting figure is that of the proportion of the working population of each country required to administer its banks, insurance companies and other financial institutions. These figures are only available for a few countries and are not given in the table. The countries for which they are available are as follows :

	Percentage of Working Population		Percentage of Working Population
U S.A.	2 4	Poland	1·5
Australia	2·4	Austria	1·2
Great Britain	2·2	Italy	0·7
Germany	1·5		

These figures do not fully indicate the extent of the resources devoted to this purpose, because a particularly highly paid type of labour is involved. In the U.S.A., for example, 5·4 per cent of the whole aggregate of wage and salary cost is incurred in this field.

Turning to the figures for the armed forces, we find that the most heavily armed countries appear to be Poland and Turkey, each with more than 4 per cent of their working population under arms. High ratios are also shown by France, Spain (1920 figures), Czecho-slovakia and the Baltic countries.

The figures for domestic service are not easy to interpret. The highest ratio of domestic servants to population is found in three countries of such diverse economic structure as India, Norway and Great Britain. As average income per head in a community rises there is undoubtedly a greater demand on the part of the richer members for domestic service, but this is more than offset, in countries like the U.S.A. and Australia, by the high wages earned by women in industry ; and only where income distribution is markedly unequal, as in Great Britain, do we find a high proportion of domestic servants. In India, on the other hand, exceptionally low wages and the absence of alternative employment enable those who have incomes slightly above the average to employ servants rather than to spend their incomes on primary and secondary produce.

We may now make some vertical comparisons within single countries, obtaining even more striking results. For the U.S.A. it is possible to get continuous figures[1] over the whole period from the present day right back to the year 1820 so far as the principal occupational groups are concerned.

U.S.A. Percentages of Working Population

	Year	Agriculture, Forestry, Fishing	Mining	Manufacture and Building	Trade, Transport, Communication	Domestic, Personal, Professional
Census without deduction of unemployed	1820	72·3	0·2	12·1	2·5	12·8
	1830	70·8	0·3	13·3	3·1	12·5
	1840	68·8	0·3	14·6	3·8	12·3
	1850	64·8	1·2	16·4	5·4	12·2
	1860	60·2	1·6	18·3	7·4	12·4
	1870	53·8	1·4	21·2	10·4	13·1
	1880	49·4	1·5	24·0	12·2	12·8
	1890	42·6	1·7	25·6	15·7	14·4
	1900	37·4	2·0	27·0	18·7	14·8
	1910	31·9	2·6	28·4	21·3	15·8
	1920	26·7	2·6	30·6	25·0	15·0
	1930	22·5	2·4	29·3	24·6	21·2
Actually in work	1929	23·2	2·3	27·1	24·9	21·6
	1935	25·4	1·8	27·0	22·1	23·7

The United States Census is now arranged in groups of occupations which can be conveniently summarised into something approaching an industrial classification, and these figures may therefore be taken to represent an approach at any rate towards an industrial tabulation. The proportion of primary producers falls steadily from 72·3 per cent in 1820 to 23·2 per cent in 1929. Since that date the unprecedented economic disturbances through which the U.S.A. has passed have had the unexpected effect of raising the proportion engaged in primary production through many of the urban unemployed re-

[1] Whelpton, *Journal of the American Statistical Society*, 1926, p. 339 1930 figures added.

Actual numbers in work for 1929 and 1935 from *National Income in the United States*, by Dr. Kuznetz, analyse as above. Dr. Kuznetz's figures have been amended to include unpaid family workers on farms included in Whelpton's figures, and estimated to number three and a quarter millions.

turning to the land as subsistence producers. It is particularly interesting to notice that the proportions engaged in manufacture and building rise to a clear maximum in 1920 and from that point onwards were already falling. Between 1929 and 1935 the fall appears to have been checked, but it is reasonable to presume that it will continue if there is another upward movement in general prosperity. More surprising still, the proportion of population engaged in trade, transport and communication also rose to a maximum in 1920 and has since shown signs of falling, the whole net surplus of released labour being devoted to the remaining tertiary services described as " domestic, personal and professional " which show a huge net absorption of 6·2 per cent of the working population between 1920 and 1930.

Great Britain

For Great Britain figures can be carried back to 1841, but on a much less certain basis.

Sources of information are as follows :

1841–1881. Charles Booth, *Journal of the Royal Statistical Society*, 1886, p. 314, attempts a systematic classification of all data for the decennial censuses from 1841 to 1881 inclusive, on a fairly detailed basis. The reputation of Booth's other work in the statistical field enables us to treat these data with some confidence. Booth's figures are given unchanged in the table opposite.

1881–1921. A comparison was attempted on an industrial rather than occupational basis over this period in *Survey of Industrial Relations* (one of the volumes in the Report of the Balfour Committee on Industry and Trade, published in 1927). There was a considerable shift-over of classification in 1911 when the classification was provisionally transferred from an occupational basis to an industrial basis, the transformation being completed in 1921. The Balfour Report, however, gives two separate figures for 1911, one for comparison with earlier years, the other for comparison with the later years. The figures exclude Scotland.

Subsidiary information was obtained from the *Fiscal Blue Book* (" British and Foreign Trade and Industry ") published by the Board of Trade in 1903. This Report gives the numbers engaged in agri-

	Industrial Figures						Occupational Figures				
	1931, excluding Unemployed	1921	1911	1901	1891	1881	1881	1871	1861	1851	1841
Agriculture, Fishing and Forestry	6·4	7·1	8·0	8·4	10·2	11·3	12·0	14 8	18·7	21·9	22·7
Mining	5·6	7·3	6·6	5·8	5·3	4·8	3·9	3·7	3·6	3·2	3·0
Building and Contracting . .	5·1	4·1	5·2	6 6	5·5	6·0	7·0	6·5	5·9	5 7	6·1
Manufacture	33·2	36·2	34·2	33·9	33·0	33·1	37·4	38·6	38·7	38·9	35·6
Transport	8·2	7·0	6·9	..	..	..	5·7	5·1	4·7	4·2	2·6
Commerce	16·7	13·2	..	..	..	..	9·6	9·0	7·8	7·0	6·6
Forces	1·0	1·6	..	..	..	..	1·1	1·3	1·4	1·1	0·8
Public Administration and Professional	9·5	9·7	..	..	..	..	4·7	4 3	4·1	3 9	3·3
Domestic	8·1	7·0	9·2	..	..	..	18·6	16·7	15·2	14·1	19·3
Other	6·2	6·8	..	..	..	..	..	..	..	..	..
All tertiary production . .	49·7	45·3	46·0	45·3	46·0	44·8	38·7	36·4	33·1	30·3	32·6

culture and fishing, mining, building and certain manufactures at each Census from 1851 to 1901 inclusive. There are considerable discrepancies in the manufacturing figures, however, during the last decade. The following are the figures on which the calculation of the numbers engaged in manufacture was based :

	(Numbers in thousands)			
	1881	1891	1901	1911
Manufactures covered by *Fiscal Blue Book*	1960	2217	..	..
Manufactures covered throughout by *Balfour Report* . . .	2039	2291	2598	3052
Manufactures covered by *Balfour Report* from 1901 . . .	..	..	4341	4970
Estimated Total . . .	3560	4000	4615	5290

Certain information about the growth in the numbers in tertiary occupations between 1881 and 1901 was given by Weldon, *Journal of the Royal Statistical Society*, 1910, p. 164. He showed a growth of nearly 50 per cent in the numbers employed in public administration and professions between these years, while the numbers employed in domestic service only increased about proportionately to the population. His figures for commerce are based on a limited definition. It may be estimated approximately that of the 45·3 per cent of the working population shown under tertiary production for 1901, commerce, transport and forces occupy 23·4 per cent and other tertiary services 21·9 per cent.

A minor adjustment was made to allow for the exclusion of Scotland from the earlier figures on the basis of the ratios between the English figures and those of Great Britain as a whole found in 1921.

1931 figures are exclusive of unemployed. The figures for agricultural population agree closely with those calculated by Fussell (*Economic Journal*, 1924, p. 275) for the whole period 1841–1911. The conclusions of Lord Eversley (*Journal of the Royal Statistical Society*, 1907, p. 267) show the change in agricultural population in more detail but refer to adult males only.

The steadiness in the fall of the proportion engaged in primary production is hardly surprising. It was most rapid in the thirty years following the repeal of the corn laws, from 1851 to 1881, and had shown signs of slowing

down between 1901 and 1911. Since 1931 it appears to have continued at an accelerated pace. Between 1931 and 1937 numbers engaged in agriculture have fallen by 11 per cent, while the numbers in work in all industries have risen by 16 per cent. This is not due to any lack of efforts to restore prosperity to agriculture so much as to the much higher level of prosperity prevailing in other industries.

But what is most noticeable about the primary production figures is the very low proportion of the population represented by the primary producers as early as 1841. Secondary production, if Booth's figures can be trusted, employed at that date 44·7 per cent of the population, or a somewhat smaller proportion than in present-day Belgium. The figures rose to a maximum in 1871 and then fell for two decades, starting to rise again between 1891 and 1901. The rise here was mainly due to a remarkable expansion of the building industry. The proportion of the population engaged in secondary production again fell between 1901 and 1911, and showed a temporary rise between 1911 and 1921, but has since fallen markedly and is now at about the same proportion as the 1891 figure.

The high figures for transport and commerce, on which comment has already been made, are shown to have risen steadily. The marked rise in the proportion engaged in transport during the railway building era from 1841 to 1871 is not surprising. The much more surprising rise since that date is largely accounted for by the increasing numbers employed in transport within large cities. What Britain gains in compactness she loses in congestion.

Regarding public administration as a profession, there has been a marked rise since 1881 in the proportion engaged in the professions, though over the last decade it appears to have been constant. The proportion of domestic servants fell during the war, and the fall has only been partially restored.

Germany

German Census figures have been calculated on a fully systematic basis since 1882, and comparisons are given in current numbers of the *Statistical Year Book.* The only amendment which has been made below has been the exclusion of women family helpers in agriculture. For the last two Censuses the numbers of unemployed have been shown separately, and they have been excluded in calculating the proportions. The final column of the table shows the numbers occupied in 1933 before deducting unemployed, and is about indicative of the situation at the present day.

Here again we notice a steady downward tendency in the proportion engaged in primary production, apart from a temporary upward movement during the depression years. The numbers engaged in secondary production reached a peak in 1925 and have fallen since. The proportion engaged in commerce and transport has risen steadily, while in services there has been a net fall, probably mainly due to a decline in the number of domestic servants.

	1882	1895	1907	1925, excluding Unemployed	1933, excluding Unemployed	1933, including Unemployed
Agriculture and Forestry .	39·1	33·3	27·0	22 2	24·2	20·4
Industry . .	36·2	39·7	43·3	47 0	38·5	45·3
Transport and Commerce .	9·0	11·4	15 4	18 3	21·8	20·6
Services . .	15·7	15·6	14 3	12·5	15·4	13·8

France

Figures for France have been extracted from the chaos of Census statistics in the late Professor Simiand's monumental work *Le Salaire.* It is necessary in this case to exclude women reported under the heading of "Agriculture", on the grounds of the erratic jumps which this figure shows.

	1827	1866	1901	1921	1926	1931
Agriculture	63	43	33·1	28·6	26·7	24·5
Industry	..	38	42·0	37·3	40·1	40·0
Commerce } Transport }	..	8	11·4	12·7	13·6	14·6
				6·5	5·7	5·8
Service	..	11	13·4	14·6	13·9	14·9

Data given by Simiand, vol. 3, pp. 32-3; 1931 added. He gives two tables, the first excluding domestics, who in 1921 numbered 863,000 out of an occupied population of 21,950,000.

	1866	1896	1901	1906
Male agriculturists and fishers	42·2	37·6	34·1	33·7
Industry	39·2	41·7	43·8	43·8
Commerce	8·2	10·8	11·9	12·6
Public Service and Professions	8·4	9·8	10·1	9·8

He next gives a table, covering also the years 1881–1911 and 1921, excluding also numbers of the forces (430,000 in 1921) and fishermen (72,000 in 1921). We have here:

	1866	1881	1901	1906	1911	1921
Agriculture	45·7	44·3	35·4	35·0	33·0	30·7
Industry	40·2	37·4	45·4	45·5	46·6	48·0
Commerce	8·6	12·8	12·3	13·0	12·8	14·3
Professions and Public Service	5·5	5·5	6·7	6·5	7·5	7·2

He also gives figures for 1901 covering the excluded classes, which agree with an analysis prepared in the report of the 1908 meeting of the International Institute of Statistics. From these tables the above general table is compiled.

Simiand also quotes an estimate made by Dupin for 1827 showing the division of the population as follows:

Agriculturists and families	60 per cent
Other workers	35 ,,
Leisured classes	5 ,,

Simiand also quotes figures calculated by De Foville showing

occupied persons and dependents taken together at decennial intervals from 1856 to 1886.

From an approximate figure of 63 per cent of the working population in 1827, the proportion of the population engaged in agriculture has fallen continuously. Bearing in mind that the last three data are at quinquennial intervals only, it is seen that the decline in recent years has been at an accelerated pace. The proportions engaged in industry, which includes a very large number of small craftsmen, appear to be slightly lower now than they were in 1901. There is an increase in the numbers employed in commerce and transport, but no very marked increase in the proportion employed in services.

Japan

For Japan a table of considerable interest can be constructed right back to the beginnings of intercourse with the outer world in 1872:

	Hijkata					International Labour Office	
	1872	1887	1897	1912	1920	1920	1930
Agriculture and Fishing (including females)	84·8	77·8	71·8	61·5	55·1	53 5	50·3
Mines	..	0 2	0·5	1·3	1·6	2·0	1 0
Manufacture and Building	4·8	9·1	12 3	17·1	19·9	20 0	18·5
Transport and Communication	0 7	0·8	1·4	2·8	3·9	3·1	3·2
Commerce	5 5	6 9	8 3	10·5	11·9	13·0	17·0
Public Administration and Professions	4·0	5·0	5 6	6·7	7·5	5·6	7·0
Domestic						2·5	2·8

Figures for 1920 and 1930 from *I.L.R.* vol 31, p. 439. For earlier years from Hijkata, quoted in *I.L.R.*, 1930, p. 504. Industrial figures, as opposed to occupational, are only compiled for 1930. The differences are very slight and the 1920 figures have been adjusted to make them comparable with 1930. Hijkata's classification is on a slightly different basis and is shown separately.

At the beginning of the period, in 1872, primary production occupied the exceedingly high proportion of 85 per cent of the working population. In no part of the world at the present time is such a high figure found, and it is indicative, as we have shown elsewhere, of extreme poverty and of the very primitive state of economic organisation prevailing at that time. By 1897 the proportion had fallen to 71·8 per cent, which was still associated with an exceedingly low level of average real income per head in the Japanese community. Since that date the figure has fallen rapidly to 50 per cent, and is still falling.

It is most remarkable that in this country also we should find evidence of a fall in the percentage of the population engaged in industry and mining, but such appears to be the case. Between 1920 and 1930 both manufacture and mining showed a considerable decline. Surplus population was largely taken up by commercial employments. The high proportion of commercial employments to the whole in Japan has already been commented on. It will be noticed how marked has been the increase during recent years. There has also been an increase in professional and domestic employment. There appears to be no upward tendency in the proportion engaged in transport.

Women engaged in agriculture have not been deducted.

Canada

For Canada we have figures classified by occupations only and not by industries. These are given in the *Census of Canada*, 1931, vol. vii. p. 982. The Canadian Census Office has rearranged the earlier figures back to 1891, on the basis of the classifications used in 1931. It is pointed out that many of the data are approximate.

The most interesting feature of this table is that the proportion of the population engaged in manufacture, mining and construction reached its peak in 1911, even earlier than in the U.S.A. The proportion of the popula-

tion engaged in primary production has been declining very rapidly. Another interesting feature is the very rapid increase of the proportion of the population engaged in transport. This is an excellent illustration of the "diminishing returns" resulting from the extension of

	Percentage Distribution				
	1891	1901	1911	1921	1931
Agriculture, Fishing, Hunting and Forestry	48·3	42·4	37·2	35·1	31·2
Mining, Manufacturing, Construction and General Labouring	28·4	30·9	32·8	29·2	29·9
Transport	3·8	4·6	6·1	6·3	7·7
Trade, Finance and Clerical	6·9	8·7	12·3	16·1	15·5
Service (personal and professional)	12·6	13·4	11·6	13·3	15·7
TOTAL occupied population, thousands	1616	1799	2724	3173	3927

settlement into the remoter areas, and has some bearing on the stationariness of average real income per head (commented on elsewhere) during the period of rapid expansion between 1901 and 1911. The proportion engaged in services only rose slowly, but the figure was already very high in 1891, corresponding no doubt to a high standard of living already prevailing at that date.

Australia

Comparable figures for Australia can be calculated back to 1871.

	1871	1881	1891	1901	1911	1921	1933	1933, excluding Unemployed
Primary	44·2	38 5	31 1	32·8	30·1	25 7	24 4	26·7
Industry and Building	26·7	29 7	31·1	26 9	28·8	31·3	32·1	27·1
Transport and Communication	3 8	4·5	6·9	7·2	8·2	9·1	8·3	8·8
Commerce	8 2	9·3	12·3	13·1	14·5	14·4	16·7	17·8
Services	17 8	17 8	18·1	19·8	18·4	19 3	18 5	19 6

The *Commonwealth Year Book* for 1928 [1] gives a comparison over the period 1871 to 1921. Data are given in the Industries tables of the 1933 Census for the period 1901 to 1933 inclusive. Discrepancies between the two sets of figures for 1901 are small.

Mining in this case is included in primary industry.

Economic development in Australia was remarkably uneven. From 1871 to 1891 the proportion engaged in primary production was falling exceedingly rapidly. During these twenty years 13 per cent of the working population were removed from the field of primary production (the absolute number of primary producers was increasing, but their ratio to the population as a whole was rapidly falling), only 4·4 per cent being added to secondary employment. The remainder entered tertiary employments of various kinds.

Between 1891 and 1901 came a series of economic disasters, where droughts and losses due to the overstocking of pastures conjoined with a fall in world prices, bank crises and labour disputes. National income figures show this to have been a period of definite setback. It is very interesting to notice a marked fall in the proportion engaged in secondary production,[2] and a rise in the proportion engaged in primary production. The proportions engaged in all forms of tertiary production, however, continue to increase. Since 1901 the proportion engaged in secondary production has increased again, and is now at a higher level than previously, the severe unemployment of 1933 having proved impermanent.

[1] P. 920. Table not reprinted in later years.

[2] "It is interesting to note that the proportional relation between the numbers in the industrial class and in the primary class was of much the same order in 1891 as in 1921, but that records from the intervening Censuses show important differences. The early nineties saw the end of a period of speculation and over-trading, with the result that many persons who had been engaged in industrial pursuits were compelled to seek employment in the primary industries. Many of these engaged in mining in Western Australia. The recovery from this crisis and the systematic encouragement of manufacturing industries, together with a world-wide tendency in the same direction, has carried the position beyond the point at which it was in 1891, and placed the industrial class in the premier place — as regards numbers — for the first time in the history of Australia. The decline in gold mining also contributed to this movement."—*Census of the Commonwealth of Australia, 1921*, vol. ii., p 199.

Denmark

Inadequate data are available for Denmark :

	1930	1921	1911	1901
Agriculture . . .	36·4	35·1	43·1	48·0
Industry . . .	27·5	27·4	25·0	24·9
Transport and Communication	5·9	6·0	4·4	
Commerce finance . .	12·5	10·9	10·8	
Public Administration .	1·2	7·0	2·0	27·0
Professions . . .	5·0		4·1	
Domestic and miscellaneous	12·3	13·3	10·7	

Figures for 1930 and 1921 from *I.L R*, February 1937. An analysis for 1911 on the same basis is given in *League of Nations Year Book* for 1930. The Report of the International Institute of Statistics for 1908 gives some figures for 1901, but the basis of classification is different, and only the broad grouping into primary, secondary and tertiary production is possible.

Professor Warming (*Weltwirtschaftliches Archiv*, May 1936) quotes the proportion of the Danish population engaged in industry and handicraft as 21 per cent in 1834 and 29 per cent in 1901.

We have here the phenomenon of an increase in the relative number of primary producers during the last decade.[1] The proportion engaged in industry is approximately constant. The proportion engaged in commerce appears to be considerably lower than in other countries and the increase less rapid. The apparent decline in the proportion employed in public administration between 1911 and 1930 may be due to a difference of classification.

Russia

The only available figures relating to Russia subdivided the population into urban and rural. It may be taken, however, that the great bulk of the rural population are engaged in agriculture.

[1] The only other country showing a marked increase in the relative number of primary producers during recent years is New Zealand, over the period 1926 to 1936.

	(Numbers in millions)		
	Urban	Rural	Per cent Urban
Whole population :			
1858–60	7·4	58·8	11·2
1897	16·2	101·6	13·8
1913	26	119	18
Occupied population (present boundaries) :			
1913	13·85	67·2	17·1
1928	13·1	74·4	15·0
1934	21·1	73·35	22·3

1858 figures from De Buschen, *J.R.S S* , 1861, p. 323. Figures for 1897 and 1913 from Oganovsky, quoted in *I.L.R.*, 1926, Part II, p. 693. Figures from 1913 to 1934 from *U.S.S.R. Handbook*, 1936, p. 56.

Some interesting statistical records are available relating to the Russia of 1836, where we find the unusual combination of an exceedingly low level of economic development associated with a highly organised bureaucratic "Polizeistaat" collecting copious statistics. Under serfdom (which prevailed until 1861) all persons engaged in manufacture or trade had to be licensed, and formed in fact a small class without the privileges of the nobility, but exempt from certain feudal services and punishments. Manufacturers and wholesalers were permitted to employ serfs. In the year 1836, when the population of Russia totalled 56 millions, the entire manufacturing and trading activities of the country were carried on by 3000 manufacturers and wholesalers employing 96,000 serfs, 39,000 retailers, and 58,000 warehousemen, or considerably less than 1 per cent of the occupied population.[1] We are fortunate in being able to obtain so accurate a picture of a highly primitive economic structure.

By 1858 the proportion of urban population had undoubtedly grown, although still very low. From that date to 1913 it was gradually increasing. It will

[1] Slowaczynski, *J.R.S.S.*, 1842, p. 300, and De Buschen, *loc. cit.*

be noticed, however, that the absolute numbers of the rural population were increasing exceedingly fast, and there is considerable evidence for the belief that rural Russia in 1913, and for that matter in more recent years, was gravely overpopulated from the economic point of view.

Between 1913 and 1928 there was an actual decline in the numbers of the urban population and a more marked decline in their relative numbers. Between 1928 and 1934 there was an exceedingly rapid increase. Even the transfer of 18 million new workers to urban employment in the course of six years, however, has only just succeeded in keeping pace with the natural increase of the rural population.

Switzerland

A systematic classification is given in *Statistisches Jahrbuch der Schweiz* from 1888 onwards. There is an ambiguous and fluctuating group, "Bernfstätigen in Anstalten", which is excluded in the calculation of the proportions below :

Year	Primary Production	Industry and Crafts	Commerce and Finance	Hotels	Transport and Communication	Professions and Administration	Domestics and Day Labourers
1888	37·7	41·4	4·6	2·5	2 7	3 9	7·2
1900	31·5	44·9	5·4	3·7	3 9	4·1	6·5
1910	27·3	45 8	6·6	4·4	4·8	4·6	6 5
1920	26 6	44·7	8·0	4·1	5 0	5·2	6·4
1930	22·2	45·6	10·0	4·9	4 5	5·4	7·4

This gives an interesting picture of the development of a country which now has nearly the highest standard of living in Europe.

The proportion engaged in industry and crafts is very high, but appears to have been about stationary since 1910. The proportion engaged in hotels has risen strongly but still only forms 4·8 per cent of the population. Receipts from this industry and from international investment account for part but not all of the difference between Swiss real income per head and the European

average. Switzerland also has a productive agriculture, and, it can be seen from the above table, does not use up an excessive amount of labour in transport.

Eire

When the Irish figures are examined, the hopeful reader may expect some paradox, and he will not be disappointed. We find here, in fact, a rising trend ever since 1871 in the proportion of the population engaged in primary production, while the proportion engaged in manufacture has been declining throughout the period. It must be pointed out, however, that Eire is the only country in the world in which the total occupied population has been steadily declining throughout the period, and that the absolute numbers engaged in primary production have been falling strongly even though they have been increasing proportionately. The figures for manufacture include handicrafts of all kinds and a number of miscellaneous and indefinable occupations. The classification in the earlier years of the Irish Census was exceedingly bad.

	1841	1851	1861	1871	1881	1891	1911	1926
Agriculture and Fishing	50·8	47·3	43·2	41·1	41·6	44·0	47·3	48·0
Manufacture	34 5	34·1	33 9	32 7	28·4	30 7	25·2	19·3
Transport and Commerce	3·1	5·0	5·9	6·7	7·0	4·5	9 2	16·8
Forces	..	..	..	..	..	1·5	1·8	1·2
Professions and Public Administration	2·2	3·3	3·7	4·3	5·0	8·2	6·1	5·6
Domestic	9·4	10·3	13·3	15 2	18·0	11·1	9·9	9·1
Numbers of occupied population, thousands	3623	3016	2734	2568	2375	2139	1806	1692

Figures for 1841 to 1881 from Booth, *J.R.S.S.*, 1886, p. 339. These figures were calculated on the same principles as used for Great Britain. Booth excluded throughout figures of the numbers in the forces, but the effect is slight. His figures for 1881 are in close agreement with those calculated by Jeans, *J.R.S.S.*, 1884, pp. 653-4.

Figures for 1891 are from Juraschek in *Die Staaten Europas*. 1911 figures are from the analysis in the *International Statistical Year Book*, excluding those recorded in miscellaneous occupations, and 1926 figures obtained by adding together the Northern Ireland and Free State Census figures.

There are many other interesting conclusions which can be drawn from this unique record of the changes in the economic structure of a declining population. In the figures for transport and commerce there is probably some discontinuity between the figures for 1881 and 1891 owing to change of source, but the rise between 1911 and 1926 appears to be substantiated. The very small proportion engaged in these activities in 1841 is indicative of the very low standard of living then prevailing. The numbers engaged in domestic service rose to a maximum in 1881, and since then have shown a considerable relative decline.

Austria-Hungary

Figures relating to the Austro-Hungarian Empire are available from 1869 to 1910, and for the present Hungarian territory from 1910 to 1930. No information is available about changes in the occupational structure of the territory constituting (from 1918 to 1938) the Austrian Republic, apart from a computation [1] showing that the absolute number engaged in agriculture within this territory was 2 per cent higher in 1930 than it had been at the beginning of the century.

	1869	1890	1900	1910
Agriculture	67·1	62·4	58·1	56·8
Industry	19·7	21·3	22·2	24·2
Commerce and Transport	5·2	6·2	7·3	8·8
Public Service and Professions	8·0	10·1	12·2	5·1
Rest				4·8

[1] *I.L.R.*, vol. 27, p. 242.

Hungary (present territory)

	League of Nations		Statistisches Reichsamt	
	1910	1920	1920	1930
Agriculture	53·6	58·2	58·2	53·1
Industry	22·7	19·7	19·6	23·8
Commerce and Transport	8·0	8·2	9·4	10·1
Public Service and Professions . . .	5·7	7·0	8·0	7·6
Rest	10·0	6·9	4·7	5·4

Figures for 1869 to 1900 from Juraschek, *Die Staaten Europas*, 1907 edition. Figures for 1910 and 1920 from *League of Nations Statistical Year Book* (1930). Comparison between 1920 and 1930 for Hungary from calculations in *German Statistical Year Book.*

We have here evidence of the comparatively slow decline of the proportions engaged in primary production and a correspondingly slow increase in secondary and tertiary production. In Hungary it appears that the dislocation of the war and post-war years caused a considerable decline in the proportions engaged in secondary production and an increase in those engaged in primary production. Doubtless the same phenomenon occurred in Austria. In the ten years between 1920 and 1930, however, this situation appears to have been remedied, and the pre-war trend had been resumed. The existence of a considerable and varying number of unclassified persons makes the comparison more difficult.

Italy

Calculation can be made for Italy over the period from 1871 to 1931.

	1871	1881	1901	1911	1921	1931
Agriculture, Forestry and Fishing	62·4	57·4	59·4	55·4	56·1	46·8
Industry	25·6	29·4	24·5	26·6	24·6	30·8
Commerce and Transport	3·6	3·9	7·4	8·9	10 4	12·7
Forces	..	..	..	1·5	2·0	0·9
Public Administration and Professions	8·3	9·3	8·7	4 0	4·5	5·6
Rest	..	..	..	3·6	2·4	3·1

Figures for 1871 and 1881 from Juraschek, *loc. cit.*, and for 1901 from International Institute of Statistics. Figures for 1911 and 1921 from *League of Nations Statistical Year Book*. 1931 figures on a proper industrial basis given by *I.L.R.*, vol. 31, p. 897. The same source gives an occupational comparison between 1931 and 1921. The differences between the occupational and industrial totals are slight, and it appears that the industrial classification for 1921 would give results closely in agreement with those quoted. Figures are inclusive of women engaged in agriculture, who cannot be shown separately for the earlier years. Excluding them from the calculation, the proportion of primary producers is as follows :

1911 . .	45·5 per cent
1921 . .	46·6 ,,
1931 . .	41·7 ,,

Here again we have the same phenomenon where the decline in the ratio of primary producers to population was checked by the war. It does not appear that the incorporation of new territory into Italy by the peace treaties is sufficient to account for the increase between 1911 and 1921. The apparent rapid decline in the proportion of primary producers between 1921 and 1931 is partially accounted for by the inclusion of an abnormally large number of women in the 1921 figures, as shown in the note above.

The growth of the numbers recorded under secondary production appears to have been slow. The very low figure shown under commerce and transport in the earlier years is indicative of a very low stage of economic development.

In an interesting note on Iceland (International Institute of Agriculture Monthly Bulletin, 1938, p. 244) it is estimated that two-thirds of the Icelandic working population were engaged in agriculture in 1900 and only one-third in 1935. Even in this isolated country the world trend is again noticeable. In fact the isolation of Iceland is more apparent than real and her dependence on world trade is greater than that of more fortunately situated countries.

Jugoslavia is a country for which information is almost completely lacking. Its occupied population in

1930 has been roughly estimated above at 4,100,000 on the basis of the ratio of occupied to total population in neighbouring countries. Frangeš (*Weltwirtschaftliches Archiv*, Sept. 1938) states that 78 per cent of the population is still peasant, though the number of industrial workers has risen from 225,000 in 1929 to 718,000 in 1937. These figures if true represent a rapidity of industrialisation which makes U.S.S.R. look pale.

Historical comparisons for a number of other countries are shown in the following table :

	Agriculture, Forestry and Fishing	Industry and Mining	Commerce and Transport	Forces	Public Administration and Professions	Domestic and Personal	Rest
Bulgaria :							
1910, L. of N. .	81·9	8·0	4·3	1·6	2·5	1·0	0 7
1920, ,, .	82·4	8·1	4·0	1 6	2 8	0·7	0·4
1926, St. R. .	80 9	10·1	4·1	0·7	3·6	0·6	..
Spain :							
1887, Juraschek	69 1	15·2	4·4	..	5 3	6·0	..
1920, L. of N. .	56·1	20 9	7·8	2 6	4 0	3·7	4 9
Portugal :							
1890, Juraschek	65·0	18 8	6·4	1·7	1·9	6·1	..
1911, L. of N. .	57·5	21·9	9·1	1·5	2 2	7·8	..
Holland :							
1899, Juraschek	30·7	33·7	17·2	1 0	5·4	10·3	1·7
1909, L. of N. .	28 4	35·2	19·2		6·7	9·5	1·0
1920, ,, .	23·6	37 8	21·3	0·6	7 6	8·1	1·0
1930, St. R. .	20 5	39 3	23·4	0·4	8 8	7·6	..
Norway :							
1891, Juraschek	49·6	22·9	11·7	0·5	3 0	10 5	1·8
1910, L. of N. .	39·5	26·0	17·0	0·6	3 8	12·0	1 1
1920, ,, .	36·8	28 9	19·7	0·3	4·8	9·1	0 4
1930, St. R. .	35·8	26·5	21·2	0·3	5·9	10·3	..
Belgium :							
1880, Jeans .	30 0	35 4	9·1	..	6·2	18 6	..
1890, Juraschek	22 9	38·2	11·6	1 7		25·6	
1910, L. of N. .	22·5	46 1	17·4	1 1	5·4	5·9	1·6
1920, ,, .	19 1	46·5	18·3	2 2	6·9	5·0	2·0
1930, ,, .	17·0	47·8	21·3		8·2	4·9	..

Sources are given against each entry. "Juraschek" refers to tables given in the 1907 edition of the *Die Staaten Europas* ; "L. of N." refers to the *League of Nations Statistical Year Book*, 1930 ; and "St. R." to calculations by the German Statistical Office published

in the 1936 *Year Book*. Belgian figures for 1930 are from a table published in the *I.L.R.*, 1936, p. 809.

The Spanish figure shown under "Industry and Mining" for 1887 is inclusive of "Arts".

Bulgaria has the distinction of having the highest proportion of population employed in primary production, followed after a long interval by Spain and Portugal. The Bulgarian figures appear to be consistent with conditions of rapidly increasing population, and there is evidence of a general decline of real income per head in that country.

In each of the other countries we find a downward tendency in primary production and an upward tendency in the figures for secondary production. Switzerland, which has by far the highest average real income of all countries shown in the table, shows some signs of having reached the maximum proportion of secondary producers in 1910, though the subsequent decline has been slight. In Holland and Belgium the proportion of secondary producers is increasing, but appears also to have reached a maximum in Norway.

In every country also there appear to have been marked rises in the proportions engaged in public administration and professions, and in commerce and transport.

These changes through time, or for that matter differences between different countries, can be fully explained in terms of two causes, and in terms of them alone. The first is the relative changes in demand on the part of consumers for different types of goods and services, analysed in Chapter XIII. The second cause is quite different and independent. Over a time when consumers' demands are not changing at all, it is possible that the output per worker may be increasing more rapidly in some forms of production than in others; under these circumstances there will be a transfer of labour away from those industries where output per head is increasing more rapidly (or decreasing less rapidly). In the case of primary produce, it is well

known that as average real income per head of consumers rises, the proportion which they will spend on primary produce will certainly fall, though the absolute amount which they spend will rise. Under these circumstances, without calling in any other explanation, we may expect the proportion of the labour force devoted to primary production to fall. We have postulated rising average real income per head, which is the same thing as greater general average output per head of goods and services, but it is unlikely that this increase in output per head will be equally rapid in all fields. Our further tasks, therefore, are to examine both changes in the relative demand of consumers for different types of goods and services and changes in the relative rapidity of increase (or decrease) of average output per head in different forms of production. If average output per head in primary production is increasing more rapidly than in other fields, as is sometimes the case, this will further accelerate the decline in the proportion of the working population engaged in primary production. The tendency observed in several economically advanced countries for the proportion of working population engaged in secondary production to rise to a maximum and then fall must be due to an interaction between these two causes.

In proceeding to our next subject, we must make perfectly clear the distinction between the adjectives "industrial" and "occupational" as used by statisticians. A man's occupation is the type of work which he performs; his industry is the type of goods or services which his employer produces. Apparently similar categories will mean quite different things in accordance with whether we are looking at the industrial or occupational grouping of the population. Thus in the last census of England and Wales (males) there were 146,000 electricians (code numbers 261 to 269) shown by the occupational Census. On the other hand, the industrial heading "electrical installations, cables and apparatus" (code numbers 170 to 179), employing 200,000 males,

only employs 57,000 males who were occupationally "electricians". Under this industrial heading were found large numbers of men of occupations recorded as metal moulders, metal machinists, fitters, commercial travellers, draughtsmen, clerks and general labourers. Of the remainder of those whose occupation was "electricians", 17,200 were employed by the industry of electricity supply, 5400 by coal mines, 5400 by the railways, 4400 in shipbuilding, 3300 by retail distributive firms, and so on. In some industries, such as coal mining, the bulk of those employed are occupationally miners also; in other industries a very wide diversity of occupations will be employed.

The point which must be clearly made is that the two causes which we have discussed above determine the *industrial* distribution of the population.

The occupational distribution of the population will of course be largely determined by the industrial distribution, but will also partially depend on changes in economic structure which are taking place within industries. The same applies to what is called the *social* distribution of the population. By this is meant the proportions of the working population found among the ranks of employers, independent business men, non-manual workers, workers in receipt of wages, and persons employed by members of their own families. More detailed social analyses are made where fuller figures are available. It is clear here also that changes in the social distribution of the population are in part determined by changes in the industrial distribution of the population, and in part depend on the changes in structure which are taking place within industries.

Apart from detailed studies, the figures of greatest general interest are those showing social structure, and broad types of occupations.

For the U.S.A. both types of investigation have been made.

SOCIO-ECONOMIC GROUPS AND POPULATION OF U.S.A., 1910–30, AND ENGLAND AND WALES, 1931

	U.S.A.			England and Wales
	1910	1920	1930	1931
Professional	4·3	4·9	6·0	4·4
Farmers	16·1	15·3	12·3	2·9
Wholesalers and retailers	3·3	3·3	3·7	3·5
Other owners, managers and officials	2·9	3·4	3·8	4·0
Owners, managers and officials	22·2	22·1	19·8	10·3
Clerks and kindred workers	10·0	13·7	16·3	13·9
Skilled workers	11·7	13·4	12·9	16·4
Semi-skilled manufacturing workers	9·6	10·4	9·3	..
Other semi-skilled	4·8	5·5	7·0	..
Semi-skilled	14·4	15·9	16·3	22·4
Farm labourers	16·3	10·0	9·0	3·1
Manufacturing and Building labourers	7·0	7·5	6·9	} 19·6
Other labourers	7·4	6·9	5·9	
Servants	6·7	5·4	6·8	10·0
Unskilled	37·3	29·9	28·7	32·7

Socio-economic groups between 1910–30 calculated by A. M. Edwards, Director of United States Census, and published in *Journal of the American Statistical Society*, 1933, p. 377. Subsidiary tables are also given there for males and females for the three Census years, and for the white and black races for the year 1930. The analysis for England and Wales for 1931 has been prepared by the present writer working on Edwards's detailed lists so as to ensure exact comparability.

On a slightly different definition another classification has been prepared for the U.S.A. giving continuous figures from 1870 to 1930. Unfortunately a considerable and variable proportion of the population has had to remain unclassified. A conventional grouping is made so as to show separately manual workers (industrial wage-earners, farm labourers and servants), and farmers, proprietors, officials, managers and professional men taken together.

U.S.A. Occupational Grouping
(Percentage Distribution)

	1870	1880	1890	1900	1910	1920	1930
Farm labourers	23·1	19·1	13·2	15 2	16·1	10 0	9·0
Farmers . .	24·0	24·6	23·6	19 8	16 3	15·5	12·4
Proprietors and officials .	4·6	4·6	5·9	6·2	7·5	7 6	8·7
Professional .	3·3	3·8	4·9	5·4	5 4	6·6	7·9
Lower salaried	2 5	3·0	4·3	4·6	6·3	9 6	14·6
Servants . .	7·8	6·2	6·4	5 0	4·1	3·1	4·1
Industrial wage-earners .	26·6	30·4	32 4	35 4	38 2	42 4	37·9
Unclassified .	8·1	8·2	9·3	8 5	6·0	5·1	5·4
Total occupied, thousands .	12,506	17,392	22,736	29,073	38,167	41,614	48,830
Manual workers	57·5	55·7	52·0	55 5	58 4	55·5	51·0
Farmers, proprietors, officials and professional .	31·9	33 0	34·4	31 4	29·2	29·7	29·0
Lower salaried workers .	2·5	3 0	4·3	4·6	6·3	9·6	14·6

Table prepared by Sogge, *Journal of the American Statistical Society*, 1933, p. 199. Figures for earlier years adjusted to render them comparable so far as possible.

Comparison between 1929 and 1935, quoted in text below, from Kuznetz, *National Income in the United States*.

The most striking features are the rapid growth in the relative numbers of professional members and the still more rapid growth in the relative numbers of " lower salaried ". All figures must be considered against a background of steady decline in the relative number of farmers and farm workers. Occupationally, as well as industrially, the proportion of industrial wage-earners to population reached a distinct maximum in 1920 and has subsequently been falling.

Taking the broadest classification, the proportion of manual workers to the population, making some allowance for the number of unclassified returns, was at a marked maximum in 1910 and has subsequently been falling. The number of " bourgeois " or business

and professional men numbered 38 per cent of the recorded population in 1890, and this proportion has also been falling subsequently. Both categories are being submerged by the rapidly rising tide of "lower salaried workers".

These impressions are confirmed in more accurate and detailed figures given by Edwards for the last three Census years. There is a rapid rise in professional men, managers and officials; insufficient, however, to offset the decline in the number of farmers. Both in the U.S.A. and Great Britain it has unfortunately proved impossible to distinguish independent proprietors of businesses (other than farmers) from salaried managers.

Among wage-earners other than farm labourers and servants it is interesting to note that the semi-skilled are growing in numbers at the expense of the unskilled. The latter showed a considerable relative decrease between 1920 and 1930. During this period there was also a small relative decrease in the number of skilled workers whose numbers had been markedly increasing between 1910 and 1920. There are few documents which will be awaited with more interest than the result of the next occupational Census of the United States. The only information so far available about changes since 1930 are Kuznetz's figures of the proportion of entrepreneurs to working population, which rose from 21·6 per cent in 1929 to 26·4 per cent in 1935. These figures include farmers and proprietors of businesses, but purport to exclude salaried managers and are only approximate. It is possible, however, that they may reveal some reversal of recent trends.

Comparison between England and the U.S.A. is remarkably interesting. In comparing figures it must be remembered that farmers and farm workers make up only 6 per cent of the English occupied population in 1931, but 21·3 per cent of the American population at that date. If we eliminate these, the English proportion of clerical workers to total occupied population of 13·9 per cent indicates a larger proportionate number

of these workers than the American figure of 16·3 per cent; but the relative number of professional men in England is still considerably lower even after the elimination of the farming population from the statistics of both countries. On the other hand, the proportion of owners, managers and officials other than farmers is higher in England even before the elimination of farming population.

Another interesting analysis can be obtained from the subdivision of all wage-earners other than farm labourers and servants. The classification between skilled, semi-skilled and unskilled is difficult but important, and much care was taken to match Edwards's figures against the detailed occupational grouping of the English Census. For each hundred wage-earners the proportions come out as follows:

	U S A.	England and Wales
Skilled . .	26·5	28·1
Semi-skilled .	33·4	38·3
Unskilled . .	40·1	33·6

From this it appears that American industry employs a definitely higher proportion of unskilled than English, and a definitely lower proportion of semi-skilled. There is a less marked difference between proportions of skilled men employed.

A detailed cross-analysis between industries and occupations is not available in most countries. Since 1921 the British Census has been compiled in separate volumes dealing with occupations and industries and, for the main industrial headings, it is possible to show relative importance of different groups of occupations within each industry, as well as social classifications.

In the table below figures are extracted for three types of occupation, namely, professional, commercial and clerical. Commercial occupations include proprietors and managers of wholesale and retail businesses, salesmen and shop assistants, bank and insurance

officials. The other two titles are self-explanatory. Occupations not covered by these three headings are (with a few exceptions) various types of manual and domestic work.

The social classification, or "industrial status" as it is described in the British Census returns, is into three classes only, namely, managerial, independent and operative. "Managerial" includes all employers and managers, whom the British Census authorities do not find it possible to distinguish. "Independent" means all those who neither employ others nor are employed by others, such as small shopkeepers and farmers, and also professional men, such as doctors and accountants.

The figures from the 1931 Census of England and Wales can therefore be analysed as follows :

Industry	Numbers in Work, excluding Unemployed, thousands	Percentages by Industrial Status			Percentages in Certain Occupational Groups *		
		Managerial	Independent	Operative	Professional	Commercial	Clerical
Agriculture and Fishing	997	18·0	15·0	67·0	.	0·4	0·3
Manufacturing and Building	7,389	4·2	3·3	92·5	0·7	2·8	6·6
Transport	1,152	3·5	3·6	92·9	0·3	0·3	10·9
Commerce and Finance	2,769	12·6	15·6	71·8	0·7	65·5	16·3
Forces	235	0·5	..	99·5	1·7	0·4	5·1
Public Administration	1,143	0·8		99·2	25·8	0·3	12·7
Professions and Entertainment	716	8·1	15·7	76·2	48·7	1·7	15·8
Domestic Service	1,381	.	.	100·0	0·9	.	0·3
Other Services	865	12·9	20·1	67·0	0·6	2·1	3·1
TOTAL, excluding Miscellaneous and Unemployed	16,647	6·4	6·9	87·7	4·5	12·4	8·2

* These figures include a small number of unemployed who have been included in the occupational classification, but their numbers are not great enough to affect the figures substantially.

Certain features are very marked here and will also be found in other countries. In primary production the proportion who own and manage their own businesses is high, and the proportion engaged in non-manual occupations is very low. In secondary production the proportion who own or manage their own businesses is lower than in any other form of activity except

transport, and only a small proportion of all those engaged in non-manual occupations are found in secondary industry. In the earlier stages of economic growth, when the relative numbers engaged in primary production are tending to fall and those in secondary production to increase, we should expect to find a reduction in the proportion of the population owning and managing their own businesses and a small increase in the numbers engaged in non-manual occupations. But as secondary production in its turn gives place to tertiary, we find, except in the special case of transport, a tendency once again for the relative numbers of employers, managers and proprietors of their own businesses to increase while the relative increase of both professional and clerical occupations is accelerated.

These points are also brought out by the German figures. In this country, all occupied persons are divided into four social categories, namely, employers and independent workers, salary-earners, wage-earners and family helpers. Continuous figures are available for each Census from 1882 to 1933, showing the proportions of these types in the whole occupied population.

Year	Employers and Independent	Salary-earners	Wage-earners	Family Helpers
1882	27·0	7·7	61·1	4·2
1895	24·6	11·4	60·0	4·0
1907	21·2	14·9	59·5	4·4
1925	18·2	19·6	57·5	4·7
1933	18·8	19·6	57·5	4·1
1933 (excluding unemployed)	23·8	20·8	50·2	5·2

Quoted annually in *Statistical Year Book.*

It is interesting to notice that the proportion of employers and independent workers reached a minimum in 1925 and was showing signs of increase in 1933 even if we include the unemployed with the working population. When we examine the figures of those actually

in work in that year, we find a marked increase. The percentage of salary-earners showed a rapid rise up to 1925, after which date it has been checked, while the percentage of wage-earners has shown a fairly steady fall.

The German figures are also subdivided into five "industries", the relative numbers engaged in which have already been examined. These are:

(1) Agriculture, Fishing and Forestry.
(2) Manufacture, Mining and Building.
(3) Commerce and Transport.
(4) Domestic Service.
(5) Other Services and Government.

For the last two Censuses a cross-classification has been given between "industry" and social status. This makes it possible for us to analyse the changes in social status between 1882 and 1933, to find out how far they are due to changes in the relative numbers employed in different industries, how far to changes within these industries. The method is to calculate what would have been the proportions of the population of different social status in each year if the 1925 intra-industry distribution of social status had held throughout. The data are expressed throughout as increases or decreases in percentages of the whole occupied population as compared with the 1925 level.

Some interesting results are shown in table overleaf. The relative number of employers and independent workers, as has been stated above, declined from 1882 to 1925, and rose from 1925 to 1933. These movements were in part explained by a decline in the relative importance of the industries in which the proportion of employers and independent workers was large, but much more by changes taking place within industries themselves. In the same way the steady decline in the relative number of wage-earners was almost entirely accounted for by changes within industries. The increasing number of salary-earners was accounted for by the two factors in more or less similar proportions.

Year	Changes between "Industries" Wage-earners	Salary-earners	Family Helpers	Employers and Independent	Changes within "Industries" Wage-earners	Salary-earners	Family Helpers	Employers and Independent
1882	+0 3	−6 0	+3 2	+2 5	+3 3	−5 9	−3 7	+6 3
1895	+0 2	−3 9	+2 1	+1 6	+2 3	−4 3	−2 8	+4 8
1907	+0 2	−1 9	+1 0	+0 7	+1 8	−2 8	−1 3	+2 3
1925	0	0	0	0	0	0	0	0
1933 including unemployed	−1 8	+2 0	−0 3	+0 1	+1 8	−2 0	−0 3	+0 5
1933 excluding unemployed	−4 5	+2 8	+0 5	+1 1	−2 8	−1 6	0	+4 5

Year	TOTAL Wage-earners	Salary-earners	Family Helpers	Employers and Independent
1882	+3 6	−11 9	−0·5	+8 8
1895	+2·5	−8 2	−0·7	+6 4
1907	+2 0	−4 7	−0·3	+3 0
1925	0	0	0	0
1933 including unemployed	0	0	−0·6	+0 6
1933 excluding unemployed	−7·3	+1 2	+0·5	+5 6

A comparative analysis by social status can be made for a number of other countries. Data are taken from above quoted sources of Census comparisons.

	Employers	Independent	Salary-earners	Wage-earners	Family Workers
U.S.A., 1930	19·7 *		22 3	58 0	..
Great Britain, 1931 (excluding unemployed)	13·7 *		19·4	66·9	..
Germany, 1933 (excluding unemployed)	23·8		20·8	50·2	5 2
France, 1931 (excluding unemployed) .	8·1	13 0	14·3	43 3	21·3
Australia, 1933 (excluding unemployed) .	10 0	17·6	72·4		..
Japan, 1930 .	21 0	11·5	67·5		.
Switzerland, 1930 .	22·3 *		15·7	62·0	.
Denmark . . .	30 6		13 7	55·7	.
Norway . . .	18·4	9 3	13·6	58·8	.
Czechoslovakia .	21 0		13·8	65 2	.
Belgium . . .	20 2		16·0†	53 2	10 0
Austria, 1934 . .	20·5		14·5	53 1	12·0

* Including managers. † Including all professions.

The ratio of manual wage-earners to occupied population is found to be higher in Great Britain than in

any other country, with Czechoslovakia second and Switzerland third, of the countries specified. In most countries wage-earners number a little over half of the population. The proportion of the population owning their own businesses is also lower in England than anywhere else, the figure being 13·7 per cent, including salaried managers. The highest proportions, of the countries shown, are those of Denmark and Japan.

The proportion of salary-earners is highest in U.S.A., Germany and Great Britain, as might have been expected.

More light can be thrown on these relations by an analysis of social structure under three principal industry headings in different countries, namely agriculture and fishing, mining and manufacture, and commerce.

PERCENTAGE EMPLOYERS AND INDEPENDENT

		Agriculture and Fishing	Mining and Manufacture	Commerce
Chile	1930 .	29·6	25·5	49·4
Austria	1934 .	28·9	15·7	33·8
	1900 .	26·4	18·9	35·6
	1890 .	23·7	20·8	37·2
	1869 .	24·7	18·2	40·1
France	1931 .	60·8	23·5	48·4
Belgium	1930 .	42·0	11·0	49·5
Switzerland	1930 .	46·8	15·6	25·8
Estonia	1934 .	..	29·2	36·5
Hungary	1930 .	33·8	23·7	37·1
Sweden	1931 .	..	11·9	29·8
Norway	1930 .	51·7	17·0	29·0
Italy	1931 .	..	20·7	60·8
	1921 .	..	22·2	67·0
Japan	1930 .	35·7	28·2	44·5
Czechoslovakia	1930 .	53·0	12·2	36·5
Denmark	1930 .	38·0	22·8	33·8
England	1931 .	33·0	7·5	28·2
Australia	1933 .	50·2	10·1	22·3
Germany	1933 .	23·3	11·6	21·1

Figures from sources previously specified. Earlier figures for Austria from Juraschek.

Some interesting results are obtained here. In agriculture, the countries with the lowest proportions of employers and independent workers (i.e. with what might be called proletarianised agriculture) are England, Chile and Austria; this tendency being even more marked in nineteenth-century Austria. The highest ratio of independent farmers to total population engaged in agriculture was found, rather unexpectedly, in France and Australia.

The figures in industry are also indicative of the extent to which the small-scale individual craftsman has given place to the large-scale plant. This tendency has been carried furthest in England and U.S.A. and is less marked in Germany. Australia is seen to be another country of comparatively large-scale industrial production. On the other hand, nearly a quarter of all industrial producers are employers or independent workers in Chile, France, Estonia, Hungary, Italy, Japan and Denmark.

In commerce the proportion of employers and independent workers to occupied population is high in every country. The proportion is highest in Italy, followed after a long interval by France, Belgium and Chile. The lowest ratio, rather surprisingly, is found in Australia, which thus appears to have the largest average size of commercial establishments, the second lowest figures being those of Switzerland.

Finally, an analysis can also be made of the proportions of salaried workers in the different fields. In mining and manufacture America and Great Britain show the highest proportions of salaried workers, followed by Germany and Switzerland, Sweden, Austria and Czechoslovakia. A high proportion of salaried workers appears to be associated, though not necessarily uniquely, with a high standard of productivity. Low but rapidly increasing figures are shown by Italy.

The proportion of the population engaged in commerce in salaried occupations is also of some interest,

though here the figures may be affected by differences of definition.

PERCENTAGE OF SALARIED WORKERS

		Agriculture and Fishing	Mining and Manufacture	Commerce
Austria	1934 .	1·1	9·8	34·7
Switzerland *	1930 .	0·7	10·2	49·8
France	1931	..‡	7·8	38·6
Belgium	1930 .	..‡	5·2	25·1
Estonia	1934 .	..‡	5·3	22·4
Sweden †	1931 .	..‡	9·5	45·5
Norway	1930 .	1·2	5·6	46·2
Italy	1931 .	..‡	3·6	19·6
	1921 .	..‡	0·8	24·1
Czechoslovakia	1930 .	..‡	9·5	35·5
Denmark	1930 .	..‡	7·9	45·5
Germany	1933 .	1·2	10·1	39·3

* Excluding managers † Census of Establishments.
‡ No data, but certainly a low figure

Some very interesting calculations showing the growth in the relative numbers of non-manual workers have been made by the International Labour Office.[1] The proportion of non-manual workers in manufacturing industry in the U.S.A. rose from 1899 to 1919, and since that date has shown a downward tendency. In Canada the proportion at the beginning of the century was higher than that of the U.S.A. and has risen irregularly, giving now the highest figure in the world. In Finland also a decline is to be noticed during the last four years, but in other countries the upward tendency has been continuous and the proportion of non-manual to manual workers is roughly correlated with the degree of productivity of the country.

When we examine the relative numbers of manual and non-manual workers in the whole occupied population, the highest ratio is found for Germany, followed by France. These figures can probably be explained

[1] *I.L.R.*, 1936, vol. 34, pp. 237 and 265.

Relative Numbers of Non-manual Workers per 100 Wage-earners

Year	Manufacturing Industry									Whole Occupied Population					
	U S A.	Great Britain	Canada	Sweden	Australia	Belgium	Irish Free State	South Africa	Finland	France	Denmark	Germany	Norway	Hungary	Switzer-land
1899	7 7														
1900			9 1												
1901															
1902															
1903															
1904															
1905															
1906										25 7					
1907		7 6										27 1			
1908															
1909	11 9								5·5						
1910			8 6			4 8									22 5
1911					7 2										
1912															
1913															
1914				9 0											
1915															
1916															
1917								6 1							
1918															
1919	15 9														
1920			15 8	10 9					7 4				22 3	8 7	27 2
1921					9 4			5 2		30 8	22 7				
1922															
1923															
1924		9 5													
1925												37 1			
1926							11 7			29 5					
1927															
1928								5 9							
1929	15 4														
1930		11 3		11 3		9 6			8 7		25 2		23 2	10 1	31 0
1931							12 5			33 1					
1932								7 6							
1933	13 3											36 9			
1934			22 4	13 0	11 0				7 0						

by the high proportion of the occupied population engaged in commerce and manufacture. The German figures are now showing a slight downward tendency, while the upward movement of the French figures is irregular. Norway only shows a slight upward movement.

CHAPTER VI

OCCUPATIONAL ADJUSTMENTS AND MALDISTRIBUTIONS

We have established in Chapter V certain long-term trends in the distribution of the occupied populations. The first is the tendency for the relative number of primary producers in any community to decline as time goes on; while the relative number of secondary producers increases up to a certain point and then also begins to diminish, and the relative number of tertiary producers increases throughout. These trends are only reversed, we have noticed, in the times of gravest economic disorganisation, and then only temporarily.

But quite apart from this, we have noticed some other trends. Within any given secondary or tertiary industry there seems to be a marked tendency for the relative number of administrative and clerical workers to increase, till in many spheres they actually outnumber the manual workers. This tendency again seems to be universal throughout the world. Within the field of manual work, the relative movements of the number of skilled and unskilled do not seem to be subject to any such wide generalisation; also they seem to differ widely as between one country and another.

Like all other economic movements, these movements must express themselves through the workings of supply and demand. The relative levels of wages in different industries and occupations are part of the mechanism whereby these changes are brought about, though we shall be mistaken if we hope to find any simple mechanism. The relative levels of unemployment in the different types of occupations will also throw some light on the question of whether the necessary trans-

formations of a progressing economy are taking place with adequate speed or not.

A very complete survey of the relative trends of wages in different types of occupation in the U.S.A. is given in Professor Douglas's *magnum opus*, *Real Wages in the United States, 1890–1926*. Professor Douglas's figures can, in a number of instances, be brought up to date (sometimes on a slightly different basis) from wage statistics published by the National Industrial Conference Board and in Dr. Kuznetz's work on National Income.

The following table is designed to show the relative movements of wages in different occupations during a period of considerably changing general wage levels. For that reason wages in a number of occupations are shown related to a standard, namely the average earnings of men factory operatives for a 50-hour week, for each year in the table.

RELATIVE WAGES
(Average Adult Male Earnings in Manufacturing = 100)

Year	Farm Labourers, 60-hr. week	Female Domestic Workers	Unskilled Town Labour, 50-hr week	Clerks, 48-hr. week	Clerical and Executive Salaries averaged together, 48-hr week	Postal Service, 48-hr. week	Federal Public Service, 41-hr week	Teachers, 6-hr day	Ministers of Religion, 30-hr. week
Professor Douglas :									
1890	38	38	74	128	176	177	265	158	256
1895	35	42	73	136	194	187	272	172	252
1900	37	40	70	126	195	172	236	176	217
1905	41	42	71	122	188	157	208	181	203
1910	41	47	72	115	187	161	198	200	198
1913	40	47	71	113	182	158	185	201	202
1918	43	38	88	110	158	120	143	159	169
1920	39	42	72	101	135	111	116	145	138
1922	28	44	63	107	151	130	132	209	181
1926	29	45	67	99	150	133	130	195	181
National Industrial Conference Board, etc :									
1926	29	..	71	.	.	..	..		.
1929	28	40	73	..	153	..	131	213	205
1932	18	..	72	..	152	..	151	244	195
1935	17	..	75	..	126	..	122	195	153

The relative earnings of farm workers have always been low as compared with factory earnings, indeed the relative discrepancy is much greater in the U.S.A. than in other countries. Up to about 1910, with the rapid movement of population away from agriculture, a slight improvement took place in relative farm wages. But from that date the relative figure has shown a downward trend to the exceedingly low level of 1935. This column shows fairly clearly that the movement of population away from agriculture, though rapid, is by no means rapid enough.

In the case of unskilled labour no definite trend is noticeable. A high relative wage was earned under the abnormal war conditions of 1918, but at the present time the ratio between skilled and unskilled wages is about the same as it was in 1890. On the demand side the requirements of industry are for a greater relative number of skilled and semi-skilled men, which would tend to keep down the relative wages of the unskilled. Against this tendency we have a certain relative movement of the labour force away from the ranks of the unskilled, and possibly also a strengthening of trade-union organisation on their part; the combined effect of these three factors has been to keep the ratio between wages steady, though there is further evidence to show that there is now very great unemployment among the ranks of the unskilled.

There appears to be a slight upward tendency in the relative earnings of domestic workers. Their relative numbers are rapidly declining. The demand for domestic service in the U.S.A. must be diminishing, relative to the demand for other goods and services, or else the relative wage would have increased more rapidly.

Of very great interest are the figures for the wages of ordinary clerks. From a maximum in 1895, when they were 36 per cent above the level of factory wages, the relative figures have fallen rapidly and steadily till by 1926 they were slightly below the average factory

wage. During this period there was a great absorption of labour into clerical occupations, but it is clear that the supply must have been increasing more rapidly than the demand. Perhaps the most important factor in this situation was the increasing availability of High School education. Professor Douglas points out that the number of High School scholars in the U.S.A. rose from 298,000 in 1890 to 2,755,000 in 1924. It is unfortunate that a continuous series for clerical salaries is not available, but judging from the figures of the average for clerical and executive salaries combined, the trend has continued.

The same tendencies are also marked in the case of postmen and Federal public servants. In the 1890's a man with the necessary degree of education and other qualifications [1] to enter the Federal Public Service was in a very privileged position, enjoying much shorter hours as well as much higher wages than the industrial worker. These privileges have now disappeared. Owing to the relative stability of these salaries, the series is subject to abnormal fluctuations in years like 1920 and 1932, but in general the trend is seen to be strongly downwards.

For teachers, on the other hand, the general trend seems to be upwards. Possibly this reflects the higher standard of qualifications now required from teachers. In the case of ministers of religion, on the other hand, the trend seems to be definitely downwards.

A systematic comparison of skilled and unskilled wages, over a period of years, in several countries, was made by Professor Richardson.[2] His figures can be brought up to date from information published in *Year Book of Labour Statistics*. The following table gives figures for 1913, for the disturbed year of 1920, for 1927 and for 1936:

[1] I am not in a position to judge the relative importance of educational and political qualifications in appointments to the Public Service at that time.

[2] *I.L.R.*, 1928. Figures for Spain added from an article in *I.L.R.*, 1928, 2nd vol., p. 256.

RATIO OF UNSKILLED TO SKILLED WAGES

	1913	1920	1927	1936
Great Britain	·603	·759	·701	·686
U S.A.	·725	·792	·750	·728
Australia	·706	·821	·825	·845
Denmark	·742	·814	·803	·834
New Zealand	·847	·856	·853	..
Spain	·675	..	·695	..
Switzerland *	·787	·870	·792 (1926)	.

* *I L R*, 1928, 2nd vol p 433, and 1927, 1st vol p. 281

Throughout the world there was a strong relative movement in favour of the unskilled in the years 1913–1920, part of which was lost again by 1927, though in every case the 1927 ratio remained above that of 1913. Between 1927 and 1936 no clear tendencies were marked.

The American figures differ slightly from those previously quoted. For exact comparisons these latter are preferable, as they are based on precise data of earnings in different crafts, whereas the previous figures took as their basis only the general average earnings of all factory workers.

Other data available [1] show that in Austria the relative wage of the unskilled worker improved by as much as 14 per cent between 1914 and 1928.

It is interesting to notice that the margin between skilled and unskilled wages is narrowest in Australia and New Zealand, and widest in Spain, of the countries so far shown.

But in order to obtain a systematic comparison of wage dispersions between countries, and not to rely solely on one pair of average wage rates for each country, a fresh calculation was made, making use of all the wage rates recorded by the International Labour Office for a comparable series of occupations [2] in all the principal

[1] *I L.R.*, 1928, 2nd vol. p. 787.

[2] Fitters, ironmoulders, pattern-makers, engineers' labourers, bricklayers, structural steel workers, concreters, carpenters, painters, plumbers, electrical fitters, builders' labourers, cabinetmakers, upholsterers, french polishers, compositors, printing machine minders, bookbinders, printers' labourers, bakers,

countries. The average wage was calculated for all these occupations, and the standard deviation about the average, thus giving a true measure of the extent of wage dispersion.

	Average Weekly Hours	Average Weekly Wage	Standard Deviation Percentage of Average Wage
Sweden . .	48	87·8 krone	13·7
France . .	48	214·0 francs	14·0
Switzerland .	48	82·1 francs	14·5
Australia . .	44	89·4 shillings	14·7
Belgium . .	48	230·6 francs	15·4
Denmark . .	48	77·6 krone	15·6
Britain . .	47	64·7 shillings	17·7
Spain . .	48	69·8 pesetas	24·3
Canada . .	46	27·6 dollars	24·5
Yugoslavia .	54	322·0 dinars	40 approx.
Japan . .	54	16·73 yen	42 ,,

These results are of great interest. In part they bear out the interesting contention of Professor A. G. B. Fisher,[1] that in countries in an early stage of economic development skill is at a premium; but that where the social structure is more developed, and technical training and apprenticeship are comparatively easy to obtain, the income discrepancies tend to narrow. The previous table, showing the tendency of the margin in most countries gradually to fall as time goes on, also supports Professor Fisher's theory. The wide margins in Spain, Yugoslavia and Japan also support his theory, while for China such information as is available [2] shows also a very wide discrepancy between skilled and unskilled

electricity supply workers, tram drivers and conductors, lorry drivers, horse carters, railway goods porters, permanent-way labourers, municipal labourers. Japanese figures from German Statistical Year Book.

[1] *I.L.R.* vol. 25, p 760.

[2] *I.L.R.*, 1925, 2nd vol p. 668, quotes:

WAGES IN CHINESE DOLLARS PER MONTH

Leather Trade (Canton)		Seed-crushing (Newchwang)		General Industry (Ningpo)	
Skilled men .	20	Mach. shopmen .	30-40	Skilled men .	18-30
Machinists .	12	Skilled men .	25-30	Unskilled .	7-15
Labourers .	8	Unskilled . .	12-15		

wages. But Canada provides a striking exception: especially as this is a country where educational facilities of all kinds are known to be very freely available. The reasons for the wide margin in Canada are not known, but this exception serves to indicate that considerations other than the "Fisher factor" operate. Possibly the relative weakness of trades unionism in Canada may explain the situation.

Sufficient comparable wage data to enable a standard deviation to be calculated are unfortunately not available for the U.S.A., but from Professor Richardson's data it appears that it should be placed about on the same level as Great Britain; in this respect France and Belgium, though countries with a comparatively low standard of living are "mature" in the sense that the differential between skilled and unskilled wages is small.

The wage structure in Japan is peculiar. Certain ancient skills, such as carpentry and paper-making, are in abundant supply and their remuneration not much above that of labourers. Exceedingly high relative wages are paid to mechanics, turners, ironmoulders and blacksmiths, over three times the labourer's wage. Occupations such as compositors, leather workers and stonemasons earn an intermediate wage.

Next we may examine international comparisons of the ratio between agricultural and industrial wages. For a number of European countries the International Institute of Agriculture made a survey [1] in 1928, expressing the wages of rural and industrial workers in terms of gold francs per day. For some other countries comparison can be made between the average of industrial wages calculated in the previous table and present-day agricultural wages shown in the International Labour Office Survey, *Labour in Agriculture.*

The countries are ranged in order of their ratios between rural and industrial wages. The only countries

[1] The main object of this survey was to examine the average labour-income of peasant farmers, which in each case transpired to be substantially below the wages of rural labourers. This is proving a little too much.

Units	Rural Wage	Industrial Wage	Rural Wage as Percentage of Industrial
From International Institute of Agriculture :			
Finland, gold francs per day, 1928	4·00	4·85	83
Estonia ,, ,, ,,	3 55	4·48	79
Latvia ,, ,, ,,	3 57	4·55	79
Norway ,, ,, ,,	7·99	13·97	57
Holland ,, ,, ,,	5·20	9·76	53
Denmark ,, ,, ,,	8·28	15·48	53
Germany ,, ,, ,,	4·46	8·64	52
Switzerland ,, ,, ,,	6·66	13·00	51
Czecho-slovakia ,, ,, ,,	2·40	4·88	49
Poland ,, ,, ,,	1·81	5·60	32
From *Labour in Agriculture* :			
Australia, shgs. per wk., 1935	73·0*	89·4	82
France, francs ,, ,,	125·0	214·0	58
Britain, shgs. ,, ,,	30·9	64·7	48
Denmark, kr. ,, ,,	26 5	77·6	34
Sweden, kr. ,, ,,	27·5	87·8	31
Canada, dollars ,, ,,	6·5	27·6	24

* This rate is only applicable in pastoral districts In dairying and agricultural areas there is no fixed wage, but the general level is lower than that specified above

in which these wages approach equality are Australia, New Zealand (see data below) and the Baltic countries. Only in these countries, therefore, can it be claimed that the relative numbers in rural and in industrial employment are even approximately in a condition of long-period adjustment. In the other countries there is a condition of relative rural over-population, whose extent is to some degree measured by the inverse of the relative wages of rural and industrial labour. In Germany, Britain, France, Holland and Norway this relative over-population may be described as moderate, though the wage-discrepancy offers enough incentive for a fairly rapid flow of labour away from agriculture. In Denmark the relative wage of rural labour is rapidly falling; in Poland, Russia[1] and Sweden relative rural over-

[1] The Russian figures (from *Critique of Russian Statistics*) are as follows :

Ratio between average real incomes per worker in agricultural and non-agricultural occupations	1913 . .	68
	1928 . .	53
	1934 . .	48

population is very strongly marked; in Canada and the U.S.A. most of all.

As was shown in a previous table, the ratio in U.S.A. was moving slightly in favour of rural wages up to 1910, and since 1918 has been moving rapidly against them. Similar figures prevail for Canada.[1]

Ratio of Farm to Manufacturing Wages

1928	55	1915	59
1925	59	1910	75
1920	74	1900	73

After 1928 there was a further catastrophic fall.

In New Zealand we have data[2] covering the period 1914 to 1931:

Ratio of Farm Wages to Average of All Wages

1914	82·8	1930	89·7
1926	79·1	1931	84·1
1929	89·8		

Here, unlike the rest of the world, the ratio has moved slightly in favour of rural wages, and indeed New Zealand is the only country in which there has been an increase, both absolute and relative, in the number of rural workers in the last decade.

For France, Simiand[3] has given data of the relative movement of agricultural and industrial wage rates from 1851 to 1921:

Ratio of Agricultural to Industrial Wage Rates
(1891 ratio=100)

1851	126	1901	99
1861	131	1906	97
1881	110	1911	102
1891	100	1921	95
1896	100		

[1] Lattimer (*Canadian Political Science Association Proceedings*, 1931) gives a comparison of annual earnings of farm and manufacturing workers between 1910 and 1928. His figures can be carried back by use of data in the *Report on Prices*.

[2] Belshaw, *I.L.R.*, vol. 28.

[3] *Le Salaire*, vol. iii. pp. 99-100.

This series is interesting in showing the climax of the relative demand for agricultural labour in 1861, followed by a fall to 1906, while between 1906 to 1911 there was a slight rise, as in the U.S.A. and Canada.

For Great Britain, Professor Bowley's figures show strange and irregular movements.[1]

RATIO OF AGRICULTURAL TO GENERAL WAGE INDEXES
(1880=100)

1860	98	1895	84
1866	91	1900	84
1870	95	1905	90
1874	95	1910	85
1877	100	1914	88
1880	100	1924	76
1885	92	1928	86
1890	88	1937	90

In general the ratio between agricultural and other wages is much the same now as it was in 1860, that is to say, agricultural wages are about two-thirds of general wages. The constancy of this ratio seems to indicate that the flow of labour away from agriculture has been about at the pace necessary to match the declining demand. There were strong movements of the relative wage in favour of agriculture in the 1870's, between 1900 and 1905, and between 1924 and 1928. In each case trade-union or legislative action was the proximate cause. It may be surmised that the underlying conditions of supply and demand left, in this case at any rate, a range of indeterminacy.

Figures quoted in the Report of the Swedish Royal Commission on Unemployment in 1931 show that the relative wages of farm workers deteriorated by as much as 31 per cent between 1913 and 1929, and probably further between 1929 and the present day. The relative rural over-population in this country seems to be becoming intensified.

[1] Data for 1860–80 from *J.R.S.S.*, 1898. Data from 1880 from *Wages and Income in the United Kingdom.*

Generally speaking, we can say that this proposition is true throughout the world, except in Australia and New Zealand, namely, that the discrepancy between industrial and rural wages is tending rapidly to widen. In the U.S.A. and Canada this discrepancy has now become fantastic. Data in Chapter V show that the rate of movement of labour away from agriculture is as rapid as ever, but it can only be concluded that the relative decline in the demand for agricultural labour has been even more rapid still. This is due mainly to the great increase in the volume of output per worker in agriculture (which has been greater than in industry) faced with a virtually stationary demand for agricultural produce.

When we examine the ratio between skilled and unskilled wages, and its changes, we find less conclusive evidence. In most countries between 1913 and 1920 there was an increase in the relative level of unskilled wages, partly due to the growth of trades unionism among the unskilled, and to Government action. In some countries there has been a moderate subsequent reaction. What is made abundantly clear from the facts in this case is that there is a great surplus of unskilled labour unemployed. In every industrial country there is evidence that the proportionate incidence of unemployment among the unskilled is greater than among the skilled.

Evidence on this matter can only be obtained from Census records. Even in countries which have universal unemployment insurance, such as Great Britain and Germany, the data are not analysed occupationally. Census records are only of value also where the numbers of unemployed are analysed by *occupations* as opposed to industries. In Great Britain, for example, this was done for the first time in the Census of 1931, with the following striking results :

PERCENTAGE OF UNEMPLOYED TO TOTAL OCCUPIED MALES, ENGLAND AND WALES, 1931

Unskilled manual workers	30·5
Skilled and semi-skilled manual workers	14·4
Agricultural workers	7·6
Forces	0
Personal service workers (waiters, barbers, etc.)	9·9
Salesmen and shop assistants	7·9
Clerks and typists	5·5
Higher office workers	5·1
Professions	5·5*
Retail traders	2·3
Farmers	0·5
Other proprietors and managers of businesses	1·3

* This figure is swollen by a large number of unemployed actors and musicians, a large number of whom at that date had recently been put out of work by cinemas and talkies In the other professions the rate was a little over 2 per cent. Figures quoted from *National Income and Outlay.*

The descent from unskilled labour to independent business is remarkable and illustrates the extensive occupational maldistribution in England.

The general level of male unemployment at the date of the 1931 Census was 13·3 per cent of the occupied population.[1] From that date to the peak of the trade cycle in August 1937 the unemployment percentage was about halved (judging from Unemployment Insurance statistics). It is very unfortunate that no information about occupational changes since 1931 is available.

It is possible that considerable transfers between occupations took place. But at the peak of the trade cycle in 1937 it appears to have been the case that all available non-manual and skilled manual labour was in employment. There remained even at that time a residue of about 1½ million unemployed, nearly all of whom must have been unskilled.

For America a very similar situation is strikingly revealed by the analysis [2] of the results of the special

[1] This must not be confused with the (much higher) percentage shown by the Unemployment Insurance statistics. These statistics, by excluding those earning higher salaries, independent workers, etc., naturally show a much higher unemployment percentage than is applicable to the occupied population as a whole.

[2] *Monthly Labor Review*, August 1938.

census of unemployment held in 1937. The tabulation covers some 7·8 millions of unemployed, including those engaged in emergency relief works. The estimated total of unemployment, including unrecorded unemployed, was 11·7 millions at that date, but it is not likely that the inclusion of data regarding the unrecorded unemployed, if they were available, would substantially alter the results of the following calculation (made by the U.S. Department of Labour):

Unemployed (including Emergency Relief Workers) in 1937 per 1000 Gainful Workers (aged 15–74) in each Occupation Group, as shown by Census of 1930.

	Males	Females
All Persons reporting an Occupation *	155	191
Professional	88	66
Farmers (owners and tenants)	29	13
Other proprietors, managers and officials	27	22
Clerks and kindred workers	102	148
Skilled workers and foremen	158	128
Semi-skilled workers	214	216
Farm labourers	194	88
Other labourers	217	108
Servant classes	175	161

* Of the recorded unemployed 2 per cent returned no occupation and 12 per cent represented young persons who had never worked Most of these, too, should probably be reckoned as unskilled.

The relative surplus of unskilled and semi-skilled workers is very marked. The table on p. 207 shows that semi-skilled workers formed an increasing proportion of the working population between 1910 and 1930. The proportion of labourers (other than farm labourers) to the total working population fell from 14·4 per cent in 1920 to 12·8 per cent in 1930, and doubtless the fall has continued. But apparently it has not been fast enough to keep pace with the radically changing demand for labour. In spite also of a decline in the proportion of farm labourers to working population from 16·3 per cent in 1910 to 9·0 per cent in 1930 (and an exceedingly

drastic fall in their relative wages), their numbers too appear to be greatly in excess of the demand for labour at the present time.

Among skilled workers the relative surplus of labour is not so bad, although they show a much higher proportion of unemployment (among males) than do clerical and professional workers. Unemployment among clerical and professional (male) workers is much the same. Among female workers, on the other hand, there is greater unemployment among clerks than among skilled manual workers.

A neat summary of Swiss statistics on this problem is given in *International Labour Review*, 1927, Part I, p. 281. Between 1913 and 1920 the ratio of unskilled to skilled wages had risen from 0·787 to 0·870 ; between 1910 and 1920 the numbers of unskilled workers had risen by 16 per cent and of skilled workers by 11 per cent ; and in 1924–26, 2 per cent of the unskilled population and 0·6 per cent of the skilled population were unemployed. This indicates a very mild degree of maldistribution.

Figures similar to those calculated above for England and Wales can be computed for Australia from the 1933 Census. This was the first Census in which true occupations were recorded as opposed to industries. In this case it was not so easy to identify those occupied as proprietors of businesses, as a cross-classification of status and occupation was not given, but only of status and industry. From the industrial tables, therefore, were obtained the numbers of employers and independent workers of various types, and it was necessary to assume that no unemployment was to be found among them, as exact information was not available. This will not seriously distort the result. The table refers to males only (see overleaf).

In this case there is the same surplus of unskilled labour, and the same relative scarcity of labour in the professions, but in the intervening range the incidence of unemployment is fairly uniform.

	Occupied, thousands	Unemployed, thousands	Percentage
Unskilled labourers	308	142·5	46·3
Semi-skilled and skilled manual labourers	1102	162·2	14·7
Agricultural, fishery, and forestry workers	283	37·4	13·2
Forces	5·7	..	..
Personal service workers	47·5	9·8	20·6
Salesmen, shop assistants and other commercial employees	175·2	32·1	18·3
Clerks and typists	115·0	15·2	13·2
Higher office workers	39·5	4·4	11·2
Professions	66·6	1·7	2·5
TOTAL	2143	405	18·9

With slightly different classifications, a table can also be compiled of unemployment in different occupations from the Canadian Census of 1st June 1931. These figures also refer to male wage- and salary-earners only.

	Occupied, thousands	Unemployed, thousands	Percentage
Unskilled labourers	422·3	154·9	36·7
Farm, forestry and fishing workers	249·4	48·2	19·3
Semi-skilled and skilled manual workers, foremen and managers	819·2	150·6	18·4
Forces	4·2	..	..
Personal service workers	101·3	12·2	12·0
Salesmen and shop assistants	97·1	10·0	10·3
Clerks and typists	123·7	9·9	8·0
Other commercial and financial occupations	92·2	4·4	4·8
Professions	112·5	5·5	4·9
TOTAL	2022·3	395·7	19·6

In Canada also there seems to be a relative surplus of unskilled labour and a relative under-supply of clerical

and professional labour. This latter doubtless is in spite of, and not because of, Canada's admittedly generous educational system, and represents the exceedingly urgent relative demand for these types of labour in a rapidly industrialising country. The wide margins between skilled and unskilled wages in Canada, noted above, are possibly also due to a similar cause.

Considerable speculation may be exercised as to the causes and cures of this serious condition of occupational maldistribution. It may be held that the comparatively high relative wage of the unskilled occupations in some countries has made them unduly attractive, and that the margin between skilled and unskilled wages ought to be widened if occupational maldistribution is to be corrected. If this could be done without forcing the standard of living of the unskilled below what public opinion would regard as a tolerable minimum, it might have such an effect. The situation in Canada, however, undoubtedly helps to destroy the case for this argument. Here, where the margin between skilled and unskilled wages is very wide, occupational maldistribution still appears to be just as serious as in other countries. The increasing surplus of unskilled labour found in nearly all countries should be attributed to a contracting demand for this type of labour, rather than to an excessive supply consequent upon unduly narrow wage differentials.

On the supply side, it seems that we should pay greater attention to a factor which economists have hitherto neglected. This is the influence of parental poverty on the children's choice of occupation. As the result of a very extensive sample inquiry in London, the *New Survey of London Life and Labour*, Professor Bowley was able to obtain some remarkable results [1] illustrating this matter. He summarised the information collected in the house-to-house sample inquiry regarding the occupations of 5550 sons over 16, and 5281 daughters over 16, in relation to the occupations of their fathers.

[1] *Economica*, 1935, p. 402.

The occupations were classified into groups :

	Males	Females
I	Unskilled and machine minders . . .	Unskilled and domestic
II	Semi-skilled . . .	Factory workers
III	Shop assistants . .	Shop assistants and waitresses
IV	Skilled	Skilled
V	Clerical, professional, working on own account .	Clerical, professional, working on own account

The data were :

OCCUPATIONS OF SONS

Occupations of Fathers	I	II	III	IV	V	Total
I	1525	131	258	416	260	2590
II	27	14	6	11	13	71
III	52	7	43	43	28	173
IV	691	149	241	855	429	2365
V *	114	20	57	90	70	351
TOTAL .	2409	321	605	1415	800	5550

OCCUPATIONS OF DAUGHTERS

Occupations of Fathers	I	II	III	IV	V	Total
I	201	1304	306	291	323	2425
II	7	24	6	11	11	59
III	4	52	39	21	49	165
IV	97	801	336	430	644	2308
V *	19	122	56	78	49	324
TOTAL .	328	2303	743	831	1076	5281

* Owing to the method of taking the sample, no fathers of families in clerical or professional occupations were included, and Group V represents, so far as the occupations of *fathers* are concerned, small independent workers and shopkeepers only.

Out of these 5550 young men, 2409 were growing up unskilled, which even on the face of it appears to be too high a proportion. Fathers in a comparatively favourable economic position (groups II, III, IV and V) in each group bring up about 30 per cent of their sons

to be unskilled labourers. But the large group of fathers who are themselves unskilled labourers bring up 59 per cent of their sons to be unskilled labourers. If their children enjoyed the same opportunities as the children of the other groups in this respect, the total supply of unskilled labour, in this sample, would be reduced from 2409 to 1663, or by 31 per cent, due to this factor alone. Similarly, entry into the skilled, clerical and professional occupations was possible for 54 per cent of the sons of skilled men and only to 26 per cent of the sons of unskilled men. (The corresponding figures for daughters were very similar at 46 per cent and 25 per cent.) Here again, therefore, it may be computed that if all children enjoyed the same opportunities of entering the better-paid occupations as are now enjoyed by the children of the skilled wage-earners, the total supply of skilled labour would be augmented by 42 per cent in the case of males and 18 per cent in the case of females: the supply of clerical, professional and independent labour would be augmented by 25 per cent in the case of males and by 37 per cent in the case of females.

These figures are not nation-wide figures of the results which would follow if these transformations of economic opportunity prevailed throughout a whole generation. The basic data on which we are working refer to young workers living with their parents, mostly between 16 and 25 years of age. The figures quoted therefore refer approximately to the changes which could be wrought in this age group as the result of a few years of changed opportunities.

Generally speaking, these figures show that the most potent factor in causing the present surplus of unskilled labour in Great Britain was the existence of a large unskilled population in the last generation (for whom there was work at that date, however), coupled with the marked difficulty experienced by sons, under present laws, customs and economic stresses governing apprenticeship and education, in entering any occupation better paid than that of their fathers.

At the other end of the scale in Great Britain, the very low proportions of unemployed among professional and business men, at a time of severe general unemployment in 1931, prompts the reflection that there is a definite shortage of supply of these types of labour, with consequent injury to the productivity of the economic system as a whole. Another consequence of such shortage would be a marked inequality of income, which indeed is found to be greater in Great Britain than in most other countries. Striking corroborative evidence of the basic hypothesis (that professional and business labour is in short supply in Great Britain) is provided by the following figures [1] of the numbers of university students per thousand of population in various countries :

	1910	1913	1925	1930	1932
U.S.A.*	..	4·21†	..	7·88	..
England and Wales	..	..	1·070	.	1·214
Germany	1·113	1·15*	1·416		1·97*
France	1·040	..	1·436	.	1·881
Holland	0·799	0·81*	1·273	..	1·57*
Sweden	1·019	1·16*	1·453	.	1·84*
Spain	0·803	.	1·408	..	1·516
Norway	0·896	..	1·645		1·655
Austria	1·273		3·157	.	3·615
Belgium	1·065		1·147		1·398
Italy	0·774	..	1·136	.	1·226
Czechoslovakia	..		2·036	.	2·325
Hungary	0·671	0·97*	1·913		1·83*
Greece *	..	0·68	..	.	1·29
Roumania *	.	0·68	1·97	.	..
Lithuania *	..	..	..	.	4·47

* *I.L.R.*, vol 33, p 305 † 1915.

The striking result emerges, that England has the lowest university population in the world, and America the highest. Other high populations are found in Austria, Lithuania and Czechoslovakia.

There seems to be little doubt that lack of education

[1] Idenburg, *Journal de la Société de Statistique de Paris*, 1934, except where otherwise specified.

— technical, secondary and university — has held back economic progress in Great Britain, and that abundance of education is an important factor in the economic welfare of the U.S.A. The supposed high quality of British education does not compensate for its lack of quantity.

CHAPTER VII

THE PRODUCTIVITY OF PRIMARY INDUSTRY

IN the measurement of the quantity of its product, primary industry has the advantage over both secondary and tertiary industries, in that its products are comparatively limited in number and of measurable quantity and quality. While the measurement of secondary and tertiary production, or of production as a whole, always has to proceed by the method of index numbers in order to cover the not directly measurable quantities, changes in agricultural production can be (and are) measured by making complete inventories of output, valued at the standard prices prevailing at some base date.

Similarly comparison can be made between the productivity of different countries. Agricultural and pastoral production in the principal countries of the world is summarised in the table below, each product being recorded by quantities and then re-valued at an international price level. This obviates false valuations due to maintenance of internal prices of agricultural produce, in many countries, above the world level. The average price received by farmers, for each commodity, in dollars, in the U.S.A. over the average of the decade 1925–34 was taken as an "international price". In this way our measurements of productivity per head of primary producers in different countries can be regarded as comparable with our measures of real income, already made, in international units. The U.S.A. was chosen as the base for the price data because she produces virtually every type of agricultural and pastoral product, competitively with the world market,[1] and also has excellent

[1] Exceptions are silk, which is not produced, and wool, which is not exported and is protected by a tariff. For silk are taken Japanese farm values per kilo of cocoons (quoted in *Statistisches Handbuch der Weltwirtschaft*) and for wool

records of the average prices received by farmers.[1]

The attempt is made, so far as is possible, to secure a measure of the true net output of agricultural and pastoral industry. (The minor industries of fishing, forestry and trapping are excluded.) An important source of duplication, neglected in many countries, arises out of the fact that a substantial proportion of the cereal output may be consumed by livestock. It is therefore erroneous to add together the recorded production of cereals and livestock products. Quite inadequate allowance on this account is made in the English official agricultural statistics, for example, as is shown by the fact that the amount of wheat estimated to have been sold off farms, plus wheat imports, gives an amount greatly in excess of the amount of wheat recorded as purchased by grain mills, after allowing for changes in stocks.

There is reason to believe that during recent years the amount of all grains (including wheat) fed to livestock has been increasing. In view of the impossibility of getting any direct measure of the extent of such feeding, it is thought better to start from the other end. The *human* consumption of wheat, rye and potatoes remains fairly constant from year to year, and this is computed for each country from family budget statistics.[2] The difference between this amount and available supplies (production + imports − exports) is assumed to

average Australian prices of greasy (National Council of Wool-Selling Brokers of Australia), respectively, converted into dollars at current rates of exchange, and averaged over the period 1925–34.

[1] These will be considerably less than "wholesale prices", which already contain elements of value added by transportation and merchanting. Data from *Agricultural Statistics* (U.S. Department of Agriculture) except for fertiliser prices, which are from *Statistical Year Book of the League of Nations* (minimum price quoted per fertilising unit, in francs, converted back to dollars per ton of commercial fertiliser at current rates of exchange.)

[2] From data in *I.L O. Year Book*, 1935–36, pp. 179-93. Data not given for Australia, New Zealand, Switzerland, (consumption per head assumed to be the same as in Great Britain); Canada, Argentine, Uruguay (consumption per head assumed to be the same as in U.S.A.); France (consumption per head assumed to be the same as in Belgium); Holland, Denmark (consumption per head assumed to be the same as in Sweden); Estonia (consumption per head assumed to be the same as in Norway).

represent consumption by livestock.[1] Other cereals than the three above mentioned are assumed to be consumed entirely by livestock, except for barley used for beer.[2]

The countries represented in the table were not selected for any reason but that for them, and for them alone, adequate statistics of output of livestock products are available. The figures of output of livestock products, net imports or exports of cereals, and net consumption of fertilisers are from the *International Institute of Agriculture Year Book* and relate in most cases to the average of the two years 1934 and 1935, occasionally to the average of the two years 1933 and 1934, being the two most recent years for which statistics of the output of livestock products are available. The statistics relating to human consumption of cereals may refer to any period within the last fifteen years, but this consumption is assumed to be fairly constant.

The production figures omit all vegetables and fruits other than potatoes, grapes, olives and citrus fruits, for the reason that, in most countries, data of both production and consumption are lacking. In the U.S.A., where the output of these crops is fully recorded, and their relative importance is much greater than in other countries, the output in 1935 of all products not covered by the following table was $1250 millions, out of a total agricultural and pastoral production of $8009 millions. In England and Wales in 1930–31 the value of these products was £33·5 millions out of a total output of £202·7 millions. In Germany in 1936–37 these products were valued at Rm. 575 millions out of a total production of Rm. 8861 millions.[3]

[1] In Japan, however, where livestock are very few, the whole output of wheat, rice and barley is assumed to be available for human consumption.

[2] Beer production in each country from *League of Nations Statistical Year Book*. Barley consumption calculated on the basis of German statistics showing an average of 18·2 kilos of malt per hectolitre of beer.

[3] For certain purposes an estimate of the output of these crops in different countries can be made on an acreage basis The above crops were grown on 3,750,000 hectares, 200,000 hectares and 870,000 hectares respectively, showing average yields of $373, £167·5 and Rm. 660 per hectare. The English prices of fruits and vegetables are high, but also the figure relates to a period some years

Fortunately these omissions are closely balanced by certain other omissions. Our object is to determine the net productivity of labour and resources employed in agriculture, and for this purpose we must deduct the value of the produce of other industries used up in agricultural production. So far we have only deducted fodder (home-produced and imported) and fertilisers (at a valuation at works). Deduction must also be made for repairs and replacement of machinery and buildings, insecticides, fuel, harness, veterinary services, etc., and certain transport. In U.S.A. in 1935 purchases of materials and services for use in agriculture other than fodder and fertilisers, amounted to $1458 millions (of which $780 millions represented depreciation of buildings and equipment) or 18·2 per cent of gross output. In England such expenses are 11 per cent of gross output;[1] in Germany in 1936–37 they were Rm. 1343 millions, or 15·2 per cent of gross output.

In general, balancing these two omissions against each other, we can say that the figures calculated below probably overstate the true net output, in countries where a good deal of machinery is used, by about 5 per cent, and are probably about equal to the true figure in other countries.

Working populations engaged in agriculture are from sources as given on p. 178 (U.S.S.R. from *Critique of Russian Statistics*: Uruguay, assumed same number relative to population as in Argentine: others from *German Statistical Year Book*). A small number of forestry and fishing workers are included in the data for Canada, Argentine, Uruguay, Czechoslovakia, Belgium, Poland, Denmark, Estonia and Switzerland

Figures are taken for males only owing to the different conventions prevailing in different countries for the measurement of female employment.

earlier than the other two. Allowing for the fall in prices between 1925–34 (our base period) and 1935, we may reasonably take an average return of $450 per hectare.

[1] *National Income and Outlay*, p. 74. Costs of running the farmer's motor car are excluded in the English figure: in the American figure they are included to the extent of 50 per cent assumed to represent costs incidental to farm production.

Production figures generally from International Institute of Agriculture, except wool (U.S Dept of Agriculture) and meat production in Argentine and Uruguay (British Dept. of Overseas Trade Reports). The official figures for these countries do not cover slaughter on farms, which is substantial. Production of milk and milk products in Argentine computed from consumption data given in *Municipal Statistics of Buenos Ayres* Poultry meat production is only given for U.S.A., Canada, Great Britain and Switzerland. For other countries it is estimated, on the basis of the above information, that the production of poultry meat is 2 lb. dressed weight per year per head of the stock of poultry in existence at the beginning of the year.

Meat and milk production figures for Japan from *Japanese Trade and Industry* (Mitsubishi Economic Research Bureau, 1936). Certain minor items in the livestock production are estimated on the basis of output per head of stock in countries similarly situated. Production of milling offals is estimated on the basis of 29 per cent of the weight of all wheat and rye consumed within the country, with additions for flour exported and deductions for flour imported. Production of oilcake and meal is estimated for each country from output + imports − exports of each material multiplied by extraction factors given in *German Statistical Year Book*, 1937, p. 165. Imports and exports of cake and meal from *U S Agricultural Statistics*, and of other feeding stuffs from British Board of Trade's *Foreign Trade and Commerce Accounts.*

Were it not that the detailed figures can be examined and checked, many would refuse to believe that agricultural productivity can show such an astonishing range of variation, from 2444 I.U.. per head in New Zealand to 120 in Japan, 88 in Russia or 46 in China.[1]

[1] This last figure can be computed from a calculation given in Prof. Buck's *Land Utilisation in China*. Production on farms was expressed in terms of grain (output of other products being re-expressed on the basis of their exchange-ratio with grain) in China and the U.S.A., and all labour converted into man-equivalents. The average grain-equivalent per man-equivalent was 20,000 kilos per annum in U.S.A. and 1400 in China. Applying our international wheat value of $3 27 per quintal, we obtain 654 I.U. per head for U.S.A. (as compared with 661 I.U. obtained above) and 46 I.U. for China.

It may be asked how this figure can be reconciled with the figure of average real income per head of occupied population in China of 112-114 I.U. (quoted on p. 44), in view of the fact that 80 per cent of the working population in China is engaged in agriculture. The answer is that the figure of 114 I.U. is based on a re-valuation of the Chinese standard of living at British *retail* prices, or, in effect, imputes to the Chinese rural population a considerable income on the grounds that such services as transport, distribution, milling and baking, which

The tremendous superiority of the new countries over the old is evident, and indeed the best results are shown in the most recently settled continent of Australasia, followed by South America. Denmark leads Europe. There seems to be justification for thinking that only the shock of migration to a completely new country and circumstances will suffice to shake the agriculturist out of his inefficient traditional methods and enable him to realise the full economic potentialities of his own labour. Even in the U.S.A. and Canada, which were already largely settled by the middle of the nineteenth century, inefficient agricultural methods seem to continue. The greatest feats of productivity have been achieved in Australia and New Zealand where a people naturally skilled in stock-breeding have been replanted on new and spacious soil.

Amongst other factors determining the productivity of primary producers, density of land settlement is certainly not to be neglected.

In Australasia and South America, settled unlike the other continents in recent years when labour was of greater value than previously, it does indeed appear that the land has only been settled to light densities which make it possible for it to yield a high average real income per person engaged.[1] The heavy reduction in density of the British agricultural population during the last sixty years has probably also been associated with their fairly high and increasing productivity. But any suggestion

have to be paid for in other countries, are either not necessary in China or are performed by the family itself. The figure of 46 I.U. is based on the wholesale price of grain alone, and is correct for measuring the productivity of Chinese agriculture, but not for measuring the standard of living of the Chinese population.

[1] See for instance Professor Griffith Taylor's analysis of population densities in areas in Australia and North Africa with similar climatic and geographical characteristics (*Geographical Review*, 1939, p. 195). He clearly shows how, under given physical conditions, high living standards are closely associated with low density of settlement :

"In Algeria, as in Australia, the importance of the 10-inch isohyet as limiting the desert on its poleward side is evident The character of the desert south of El Kantara is very like the similar sparsely vegetated regions in the south of Australia. The differences in the standards of living in the two

that there is a direct and unique causal relationship between density and productivity is shattered by the high productivity of Denmark and Holland, where densities are high, and the low productivity of Russia and Estonia, where density is no greater than in Britain. Japan with her truly astonishing density of 868 workers per 1000 hectares is able to show a better productivity than Russia or China (for China the density figure would probably be 300-400).

	Males Occupied in Agriculture per 1000 Hectares Arable and Pasture Land	Productivity per Head I U.
Australia *	7	1524
Argentine	7	1233
New Zealand	20	2444
Uruguay *	23	1000
U.S.A.*	25	661
Canada *	35	618
U.S.S.R.	64	88
Great Britain	70	475
Estonia	79	268
France	134	415
Denmark	146	642
Germany	162	490
Switzerland	166	433
Czechoslovakia	205	287
Poland	206	195
Holland	235	579
Belgium	388	394
Japan	868	120

* Area of pasture not recorded because not exactly defined. Assumed to be five times the area of arable land (the ratio found in Argentine and New Zealand) in Australia, Canada and Uruguay In U S A. crops and pasture are assumed to cover one-half of the total area of the country

countries are, however, suggested by the following table, where the figures are, of course, only approximations :

Rainfall	4	10	16	40	inches per annum
Population in Algeria	2 ?	25	45 ?	120	per sq. mile
Population in S.E. Australia	0	0	1 or 2	over 8	per sq. mile "

To obtain a full insight into the economic consequences of these varying figures of labour productivity, the production data for each country should be converted into consumption data by the addition of imports and the subtraction of exports.

We can compute the imports and exports of agricultural produce into each of the countries for which we have production statistics, distinguishing foodstuffs from industrial crops and produce. Fresh price data are necessary for a few articles which have been included in the production table on a different basis (e.g. wine, which has been included in the production statistics in the form of grapes; hides and skins in a general value for cattle, etc.) together with certain tropical produce not included in the production statistics of any of the countries examined.

Prices here have been taken from average British import values over a decade.

In determining the cost of the optimum diet we may examine, as a most illuminating standard of consumption, figures computed by Sir John Orr for the quantities of foodstuffs consumed by various sections of the British population. He divides the population up into six classes in accordance with their average income per head. The poorest 10 per cent of the population are defined as Class I, and the wealthiest 10 per cent as Class VI. The remaining four classes each contain 20 per cent of the population.

In the following table the quantities of food consumption for these six classes are given, together with their wholesale values, at the standard prices adopted for measurement of agricultural output.

Sir John Orr points out that the diets of the first three classes, or 50 per cent of the population, are defective in varying degrees. With the possible exception of calcium, the diets of the other three classes are adequate in all respects. An optimum diet, so far as it can be measured, would probably represent a wholesale value of about $60 per head per year measured at these prices.

	Consumption, kilos per head per year						Wholesale Value, $ at 1925–34 Prices					
	I	II	III	IV	V	VI	I	II	III	IV	V	VI
Bread, flour, cakes, etc., expressed as wheat . .	104·1	107·2	107·2	105·7	102·5	94·7	3·40	3·51	3·51	3·46	3·35	3·10
Beef and veal .	15·5	21·4	25·4	27·9	28·7	27·9	4·16	5·32	6·08	6·52	6·60	6·28
Mutton and lamb .	4·6	8·3	10·6	13·9	17·1	20·5	1·25	2·25	2·87	3·77	4·63	5·56
Pork, bacon and other meat .	17·9	25·1	30·8	34·8	38·2	44·4	7·02	9·18	10·85	12·09	12·9	14·6
Margarine, lard and fat * . .	10·6	10·5	9·9	9·4	8·7	7·1	..	..	..	..	..	..
Milk . . .	54·8	82·1	96·0	109·7	140·1	177·3	2·16	3·25	3·79	4·34	5·53	6·99
Butter . . .	4·4	9·6	11·1	12·5	14·0	16·2	3·65	7·95	9·20	10·35	11·6	13·4
Cheese . . .	2·7	3·7	4·6	5·3	5·3	3·8	1·06	1·46	1·82	2·10	2·10	1·50
Eggs . . .	4·5	6·2	7·7	9·5	10·7	13·4	1·43	1·97	2·45	3·01	3·39	4·25
Potatoes . .	78·1	82·6	85·4	84·0	84·0	79·6	2·59	2·73	2·83	2·78	2·78	2·63
Sugar † . .	32·7	38·5	42·9	46·0	48·5	49·7	1·90	2·23	2·48	2·66	2·81	2·88
Tea . . .	3·2	4·0	4·3	4·4	4·3	4·0	2·10	2·64	2·83	2·90	2·83	2·64
Fruit and vegetables ‡ . .	..	..	..	..	..	..	2·1	3·8	5·6	7·8	10·3	15·1
Total . .	..	..	..	..	..	..	32·8	46·3	53·2	61·7	68·8	78·9

* As the bulk of these fats are obtained from meat, these quantities are added to the quantities of beef and pork consumed and the whole priced in terms of the price of the carcase as a whole.

† Including half the weight of jam consumed.

‡ On the basis of 50 per cent of their recorded retail selling value.

$ MILLION AT 1925–34 PRICES

	Recorded Output of Food-stuffs	Un-recorded Output of Fruit and Vegetables	Net Imports (+) or Exports (−)	Con-sumption	Do , per Head of Population	Other Produce	Net Imports (+) or Exports (−)	Con-sumption	Do , per Head	Ratio of Output to Consumption		Percentage of Total Labour Force required to provide for Whole Population		
										Food-stuffs	Food-stuffs and Ind. Produce	Optimum Diet	Actual Current Diet	Requirements of Industrial Crops and Produce
Zealand .	304	27	−206	125	80 5	82	−77	5	3 2	2 65	3 18	6 4	8 6	0 3
ralia	597	71	−248	420	62 6	271	−215	56	8 3	1 64	2 01	9 7	10 2	1 3
ntine . .	1177	250	−354	1073	88 1	299	−231	68	5 6	1 33	1 51	12 4	18 2	1 0
guay . .	158	13	−16	155	76 7	45	−28	17	8 4	1 10	1 26	15 3	19 5	2 1
America .	5530	1690	826	8046	63 3	1303	−179	1124	8 8	0 92	0 93	23 4	24 7	3 4
mark .	363	5	−177	191	52 0	2	21	23	6 3	1 93	1 73	22 2	19 3	2 3
ıda .	778	200	−145	833	76 3	21	26	47	4 3	1 17	1 14	25 3	32 2	1 8
and	386	81	−15	452	53 9	6	65	71	8 5	1 03	0 89	26 5	23 7	3 8
many . .	2616	392	281	3289	49 3	52	322	374	5 6	0 91	0 84	29 0	23 8	2 7
t Britain .	804	100	1399	2303	49 1	44	425	469	10 0	0 39	0 34	27 0	22 1	4 5
zerland .	179	25	49	253	60 9	2	15	17	4 1	0 81	0 76	30 1	30 5	2 1
ce . .	1910	450	228	2588	61 7	49	250	299	7 1	0 91	0·83	32 9	33 6	3 9
lum .	299	34	117	450	54 4	7	72	79	9 6	0·74	0 64	36 4	33 0	5 8
len .	262	26	11	299	48 0	1	28	29	4 7	0 96	0 88	39 3	31 5	3 1
hoslovakia	506	95	14	615	40 5	10	46	56	3 7	0 98	0 90	52 2	35 7	3 2
nia . .	57	3	−9	51	45 2	1	1	2	1 8	1 17	1 15	60 0	45 2	1 8
nd .	1029	336	−31	1334	39 9	24	35	59	1 8	1 02	1 00	98 6	64·9	2 9
n .	846	650	32	1528	22 3	213	89	302	4 4	0 98	0 93	140 5	52 2	10 3
S.R. . .	3344	800	−48	3996	23 4	476	15	491	2 9	1 04	1 03	200 0	78 0	9 7

10 per cent of the value of output of cattle and calves and 5 per cent of the value of sheep are assumed to represent hides and skins and are therefore not included with foodstuffs

Sir John Orr's figures of the numbers of population in each class are round figures only and a more precise calculation is quoted in *National Income and Outlay.*

Percentage Distribution

Class I	13·7
„ II	16·9
„ III	16·5
„ IV	25·3
„ V	19·4
„ VI	8·1

We are now in a position to assemble all the data for comparison. The omission of the unrecorded output of fruit and vegetables might seriously affect the consumption figures, and therefore a rough estimate is included computed on the basis of 450 I.U. per hectare. We thus obtain figures of food consumption per head of the population ranging from 88 I.U. in the Argentine to 22 I.U. in Japan. Consumption of industrial crops and produce per head of the population never exceeds 10 I.U., which is the figure for Great Britain with a large export trade in textile goods, and may fall as low as 1·8 I.U.

The ratios between output and consumption are of considerable interest. Great Britain, as is well known, is most dependent upon agricultural imports. Her home output is only 39 per cent of her requirements of foodstuffs, or only 34 per cent of requirements if agriculture or materials are taken into account. Belgium shows the next highest degree of dependency, followed by Switzerland. Among the exporting countries, the highest ratio of output to home consumption is shown by New Zealand, which consumes less than one-third of its agricultural and pastoral produce. Australia consumes one-half of her produce, Denmark 58 per cent and the Argentine two-thirds.

The most interesting form in which the conclusions can be expressed is shown in the last three columns, which compute for each country, on the basis of its figures of average output per head computed above, the

proportion of its labour force required to provide,[1] per head of the population :

(1) An optimum diet ;
(2) The actual current diet ;
(3) Other requirements of industrial crops and produce.

To supply its entire population with an optimum diet of 60 I.U. per head would occupy only 6·4 per cent of the labour force of New Zealand and 9·7 per cent of Australia. It would occupy nearly the whole labour force of Poland, and would absorb far more than the produce of the whole labour force in Japan, Russia, India and China.

In the countries of the New World average food consumption is over 60 I.U. per head and a surplus is available for export. (Even in these countries there are substantial proportions of the population with a diet below optimum.) In Europe, except perhaps Switzerland and France, the average food consumption is well below the optimum diet. This is the case even in Great Britain, where average real income per head is high, but its distribution is very unequal. The distribution of food consumption in Great Britain is shown in the table above.

The supplying of industrial crops and produce for the U.S.A.'s requirements of 8·8 I.U. per head per year occupies 3·4 per cent of her labour force. Britain and Belgium also consume large quantities of these materials, mainly wool and cotton, most of which they import. These importations displace imports of agricultural produce equivalent to the output of about 5 per cent of the whole working populations of Britain and Belgium.

Four factors determine the proportion of the working

[1] Requirements per head are multiplied by the ratio between total and occupied population, and then compared with the figure of real output per male occupied in agriculture. Females reported to be occupied in agriculture are excluded from occupied population as on page 40 above.

population of any country engaged in primary production:

(i) Average output per worker engaged in primary production.
(ii) Level of average diet.
(iii) Requirements of industrial crops and produce.
(iv) Ratio of imports and exports to output of primary produce.

Thus the efficiency of primary production in the U.S.A. is such that 23·4 per cent of its labour force could supply the whole country with an optimum diet. The average diet actually consumed is slightly above this, giving a figure of 24·7 per cent of the working population. Of this food consumption 10 per cent is imported, reducing the figure to 22·2 per cent. Industrial crops represent 3·4 per cent of the working population, or 3·9 per cent including the United States' export surplus of these crops, giving a total of 26·1 per cent of the working population. This is very close to the proportion actually found to be engaged. Exact agreement cannot be expected owing to variations in dates, valuation of imports, and other details.

Similarly New Zealand can give her population their present generous diet with the employment of only 8·6 per cent of her labour force. Exportation of foodstuffs employs another 14·2 per cent of her population and the production of industrial materials (wool, hides, etc.) 0·3 per cent for home consumption and 4·6 per cent for export, making up 27·7 per cent of the working population in all—again very close to the actual figure.

Agricultural productivity in many countries has greatly increased, and shows every sign of further increases in the future. Ezekiel and Tolley[1] have estimated that in the U.S.A. the volume of agricultural production per worker engaged has grown as follows (manufacturing and mining figures are given for comparison):

[1] *Annals of the American Academy of Political Science*, November 1936.

VOLUME OF OUTPUT PER HEAD
(1900 = 100)

Year	Agriculture	Manufacture	Mining
1870	55	64	36
1880	77	75	56
1890	82	93	84
1900	100	100	100
1910	100	117	104
1920	119	131	139
1930	141	163	147

Output per head in agriculture, therefore, has grown as rapidly as in manufacturing.

Estimates showing a somewhat less rapid increase in recent years are given in *America's Capacity to Produce.* The Census data are here adjusted to convert female and juvenile labour into adult male equivalents, and uniform treatment is given to figures of casual labour (which vary owing to the different dates on which the Census was taken). Volume of production per labour-unit was as follows :

1897–1901	100·0	1917–21	107·6
1907–11	97·2	1927–31	132·9 [1]

The authors show clearly that this increase in productivity is not due to greater capitalisation, but rather the reverse. Converting the recorded values of buildings, implements and livestock to a volume basis, they find the quantity of capital employed per labour unit as follows :

1900	100	1920	121
1910	98	1930	119

The greatest increase in productivity occurred during the last decade, accompanied by a slight fall in the volume of capital per unit of labour.

[1] The U.S. Department of Agriculture estimates (in *The Agricultural Situation*, February 1939) that 10 7 million farm, family and hired workers in 1938 produced 25-30 per cent more output than 12·2 million workers produced in 1909. This gives an index for 1938 of about 141.

This increase has been examined in more detail by Dr. O. E. Baker.[1] Production of livestock products between 1917–21 and 1922–26 rose by 16 per cent, and Dr. Baker attributes this increase to three main causes. Two-fifths of the increased output was attributable to greater output (of milk and meat) per head of livestock and per unit of feed consumed ; one-fifth to the change-over from beef cattle to more remunerative animals ; and another two-fifths to the passing of the horse and the consequent release of feed for other uses. In U.S.A. in 1919 no less than 80 million acres of land were required to grow feed for the horse population, and the release of this land caused great geographical shifts of production, which were accompanied by advantageous specialisation. Greater output of meat per unit of feed consumed was obtained by slaughtering beasts younger (for the "weight added to feed consumed" ratio is higher in a younger beast) and by breeding better strains. Milk production per cow, Dr. Baker shows, increased by 12 per cent between 1920 and 1924, and by the time of the next quinquennial census in 1929 had increased a further 18 per cent to 4490 lb. per annum. It is regrettable to have to record that during the next five years of economic chaos this gain was lost, and for 1934 the figure was recorded as 3725 lb.

The improvement in agricultural productivity in Great Britain since 1870 can be measured by use of Dr. Drescher's index[2] of the volume of agricultural production in Great Britain. This is re-calculated to a 1930–31 base, from which date onwards we have figures of the volume of production in England and Wales (changes in Scotland assumed to have been similar) published annually by the Ministry of Agriculture. Changes in the numbers engaged are determined from the Census records, and since 1931, from the annual Agricultural Statistics showing the numbers of workers

[1] United States Bureau of Agricultural Economics, memoranda circulated December 1927 and December 1928.

[2] *Weltwirtschaftliches Archiv*, March 1935.

employed, the number of farmers being assumed to have remained constant.

Years	(1930–31 = 100)		
	Volume of Production	Numbers engaged	Output per Head
1870–72	90 0	124·3	72·3
1880–82	92·6	112·0	82·7
1890–92	104·9	115·1	91·1
1900–1902	102·8	106·7	96·5
1910–12	108·0	114·2	94·5
1920–22	103·2	107·0	96·5
1930–31	100·0	100·0	100·0
1934–35	118·0	97·4	
1935–36	112 0	95·3	
1936–37	117·0	93·4	
Mean of 3 years	115·7	95·4	121·1

It must be remembered that between 1901 and 1921 working hours in agriculture were reduced by about 10 per cent; and between 1921 and the present time by another 5 to 10 per cent.

Though the increase in productivity was not so marked as in the U.S.A., it has been accelerated in recent years. During the present decade the rate of migration of labour away from agriculture in Great Britain has been more rapid than ever before; for 1938 the figure for numbers engaged had fallen to 89·7.

In preparing his estimates of the output of livestock products, Dr. Drescher assembles the available information enabling him to analyse the beneficial effects due to earlier slaughtering. The number of slaughterings per 100 of the livestock population, in the case of cattle and calves, was 24 in 1850–60 and 36 in 1930; for pigs, 116 and 136; and for sheep and lambs, 35 and 43 respectively. The average dressed weight of carcases was as follows:

Years	(Weight in lb)				
	Cattle	Calves	Sheep	Lambs	Pigs
1867–70	560	75	56	34	90
1908	672	98	67	38	160
1925	628	87	60	39	160

indicating that, in spite of earlier slaughtering, the average weight of meat, except of sheep and calves is now greater, due to improvement of breeds.

The cultivation of wheat is not an important part of the English agricultural economy but some interesting conclusions have been drawn regarding it. In this field particularly we should expect the law of diminishing returns to operate, and yields per acre to vary inversely with acreage. Dr. Drescher quotes some early estimates showing an acreage of 2,795,000 in England and Wales in 1771 with an average yield of 24 bushels[1] per acre. In 1812, the worst year of the Napoleonic wars, acreage had risen to 3,160,000 and yield per acre had fallen to about 22 bushels. Although this fall appears slight, it means that the marginal land can only have been yielding 8 bushels per acre, which accounts for the fabulous rises in prices and rents of that period (circumstances which provided the background of Ricardo's writings). From the 1800's wheat acreage fell, and for the decade 1885–94 was 2,162,000, with an average yield per acre of 29·35 bushels. During the next decade acreage again fell heavily. In 1910 H. D. Vigor[2] calculated an equation of diminishing returns. He used not temporal data but geographical, comparing by counties the fall in wheat acreage between 1885–94 and 1899–1908, and the rise in average yields per acre during the same period. He got a correlation coefficient of $-0{\cdot}346$ and a regression equation :

$$\left.\begin{array}{c}\text{Percentage rise in yield}\\ \text{above 1885–94 level}\end{array}\right\} = \left\{0{\cdot}199 \times \text{percentage fall in acreage}\right.$$

[1] 1 bushel (volume measure) of wheat = 60 lb. [2] *J.R.S.S.*, 1910, p. 396.

That this probably does represent a true law of diminishing returns is shown by the fact that we can transfer it from the geographical data to the time series and correctly compute changes in yield per acre for many years after the time for which it was computed. We may sum up the data for the periods 1916–22, in which wheat acreage was much increased by war and subsidy; 1924–32, a period of low acreage; and 1933–36, when acreage was again increased in consequence of the subsidisation of wheat production:

Years	Acreage, thousands	Computed Yield per Acre	Actual Yield per Acre
1885–94	2162	29·35	29·35
1899–1908	1614	31·9	31·4
1916–22	2060	29·7	30 7
1924–32	1428	31·3	31·4
1933–36	1724	30·5	34·3

This formula has predicted yields surprisingly closely, and it appears that only during the last few years have improvements in strains of wheat and in technique enabled the English wheat farmer to escape from the predestinate grooves of diminishing returns.

It also appears from this formula that at the present time the marginal yield is not seriously below the average yield.

Neymarck (*J.R.S.S.*, 1889, p. 320) estimated that the average yield per acre of wheat in France rose from 9·0 bushels in 1789 to 18·4 in 1889.

In the cultivation of rice in Japan, on the other hand, diminishing returns have been constantly set aside. The table overleaf[1] shows steadily rising acreage with rise yield per acre while the number of workers in agriculture has also diminished.

In Germany an estimate[2] has been made of the real net value of agricultural production, a deduction being

[1] Sato, *Economic Journal*, 1918, p 448, and *League of Nations Statistical Year Book*. [2] *Institut fur Konjunkturforschung Bulletin*, 20th October 1937.

Years	Rice Area, million hectares	Yield, quintals of milled rice per hectare
1878–87	2·61	13·4
1888–97	2·77	15·1
1898–1907	2·90	16·8
1908–14	3·02	18·8
1925–29	3·15	21·6
1930–34	3·19	21·9
1936–38	3·19	24·0

made for the amount of imported fodder used. The numbers engaged in agriculture are known for the Census dates of 1933, 1925 and 1907, and the rate of growth prior to 1907 is extrapolated to estimate an average for 1909–13. Data are not available regarding changes since 1933, but the increase in the agricultural working population since that date has been small, if any.

Years	Real Net Production, index number	Occupied in Agriculture, millions
1909–13 old boundaries)	110	9 03
1924–25	96	9·76
1925–26	95	
1926–27	90	
1927–28	96	
1928–29	104	
1929–30	109	
1930–31	111	
1931–32	113	
1932–33	108	9·34
1933–34	117	
1934–35	123	
1935–36	120	
1936–37	123	

Not until 1933, it appears, was the 1909–13 rate of output per head recovered, and there has been no exceptional advance since that date.

Output data for France are available for a long period of time, but data for reducing these to real terms are lacking. From 1929 onwards we have M. Dugé de Bernonville's annual calculations of the value of agricultural net output in *Revue d'Économie Politique*, reduced to 1913 values by means of the price index for agricultural produce. These show a disastrous downward trend :

Year	Frs. Md. Current	At 1913 Prices
1911 (Pupin)	12·7	12·7
1929	60·9	10·5
1930	51·4	9·75
1931	46·7	8·6
1932	42·0	8·7
1933	41·0	9·8
1934	30·5	7·8

The average annual yield of milk per cow is an important measure of agricultural progress (though it must not be forgotten that a high gross yield is occasionally produced only as a result of expensive feeding). The following table contains data based on the *International Institute of Agriculture Year Book* for 1934–35, and on data collected by Rew (*J.R.S.S.*, 1892, p. 250, and 1904, p. 417) and from other sources as indicated. Data in each case set out to show net production after deducting milk sucked by or fed to calves. In U.S.A. and Australia cows with beef herds on ranches and cattle stations (which are never milked) are excluded from the figures.

The countries in the first half of the list show gradual progress over a long period of time. But also there are a number of countries, including some of the principal producing countries, whose figures not only are low, but which appear to have made little progress during the last forty years. A great field for further progress apparently remains.

That low-yielding cows are not economic is shown

most strikingly by a comparison between South Africa and New Zealand.[1]

It is estimated that South Africa has four-fifths as many cows as New Zealand and Denmark together, but

MILK YIELD PER COW IN QUINTALS (220·4 LB.) PER YEAR

	1934–35	1911–13	1890–1900, Rew	1880–90, Rew	1870–80
Holland	33·1	..	..	..	..
Switzerland	31·8	..	24·8 **	..	..
Belgium	31·1	..	..	..	..
Denmark	31·0	26·2 §	21·5	13·3	..
England	28·6	..	18·7	..	17·7
New Zealand	23·8	..	16 9	..	..
Germany *	22 3	..	16·8	..	..
Austria	20·5	..	..	..	.
Ireland	20·3	..	..	..	.
Iceland †	20·0	.	.	..	..
Estonia	20·0	..	..	..	..
Canada	19·2	15 0 ‖	10·1 ‖	..	..
Finland	19·0	..	.	..	..
Sweden ‡	19·0	..	18·5	..	.
U.S A.	17·9	..	16·5	..	.
France	17·1	..	16·5	15·5	..
Norway	16·4	..	..	..	..
Australia	16·3	..	14·7	..	..
Albania	12·2	.	..	..	..
Russia	10·4	..	..	.	..
Spain	10·0	..	..	..	..

* By 1936–37 this had risen to 24 9 (*Stat. Jahrbuch*)
† *International Institute of Agriculture Monthly Bulletin*, 1938, p. 244
‡ From data in *National Income of Sweden.*
§ Official statistics.
‖ Coats (Report on Prices)
** Geering and Hotz, *Wirtschaftskunde der Schweiz*

has only one-fourteenth of their butter and cheese output. The cost of production of butter fat, with native labour, in South Africa, was 12 pence per lb. A detailed estimate of the cost of producing butter fat in New Zealand in 1937–38, made by the New Zealand Govern-

[1] Kneen, *South African Journal of Economics*, 1935; Haines, *South African Journal of Economics*, 1935; *New Zealand Year Book*, 1938, p. 448.

ment, shows a net cost of 13·88 pence per lb., including 3·06 pence interest on capital and 7·29 pence for all labour performed by the farmer, his family and wage-workers, at an imputed wage for an adult man of £162 per year. Average earnings of adult male black farm workers in South Africa, in cash and kind, are £16·5 per year and their hours of work 72 per week, as against 48 or less in New Zealand. It seems that, in agriculture as in industry, methods of high productivity will not be introduced so long as abundant supplies of cheap labour are available.

International comparisons of crop yields in quintals

WHEAT YIELDS, QUINTALS PER HECTARE, 1926–30

(Int. Inst. of Agriculture)

Holland	29·8	Hungary	14·0
Denmark	27·4	Poland	12·4
Ireland	27·0	Italy	12·4
Belgium	25·5	Canada	12·2
New Zealand	22·7	Yugoslavia	11·5
Great Britain	21·3	Bulgaria	10·7
Sweden	21·2	Roumania	9·8
Switzerland	21·1	U.S.A.	9·7
Germany	19·9	Spain	8·9
Japan	17·6	Argentine	8·7
Egypt	17·3	Russia	7·5
Norway	17·2	Australia	7·3
Czechoslovakia	17·1	India	7·1

per hectare can readily be made, but they tell us little about the comparative productivity of the agricultural systems of different countries. In the accompanying table of wheat yields, for instance, yields are seen to be highest in countries in which very little wheat is grown, and in which therefore soils for wheat-growing can be carefully selected; and are low in some countries such as Canada and Australia, where wheat is produced extensively at low cost on arid or arctic soils. However, neither can we accept the converse proposition, that a low yield per hectare is a sign of economic efficiency. Only when we can make actual comparisons of costs of production,

expressing labour in terms of real units, can we judge the economic efficiency of agriculture.

It is possible to make some interesting international comparisons in this way of the costs of production of rice in U.S.A.,[1] Japan,[2] Italy[3] and China.[4] Costs for direct labour and other costs may be expressed in terms of days of ten hours each of labour, by dividing the figure of money costs by the average level of rural wages. In the case of U.S.A. and China, our sources state directly the amount of labour required.

Costs of Production per Quintal Rough Rice
(1·62 lb. rough rice = 1 lb. milled rice)

	Japan (1927), Yen	Italy (1931), Lire	China (1921–25),	U S A. (1934) Dollars
Total cost of production .	10·4	65·0	..	3·80
Do. in terms of working days	8·2	3·6	..	2·9
Including labour . .	4·6	..	4·55	0 3
Other costs * . . .	3·6	..	..	2·6
Average yield (quintal per hectare) assumed in cost calculation . . .	29·8	44·5	25 6	24·8
Average yield (quintal per hectare) actually realised 1934–36 . . .	34·5	50·4	25·0	24·4

* The Japanese original figures included rents and taxes, which are excluded in this table.

The lowest real cost is found in U.S.A., with a low yield per hectare, but in Italy, where yield per hectare is nearly double that of U.S.A., a low real labour cost per quintal is also found. Probably the Italian figure includes a higher labour cost and lower machinery costs than the American : but it must be admitted that reduction of labour costs in agriculture to a very low figure is often accompanied by a rise in other costs.

[1] Cole, *Quarterly Journal of Economics*, 1927.
[2] Yagi, *Kyoto Economic Review*, 1930.
[3] Boggeri, *Weltwirtschaftliches Archiv*, January 1934.
[4] Buck, *Chinese Farm Economy*.

The Chinese figure of real labour cost is much the same as the Japanese, and it is probable that other real costs too are much the same in the two countries. The difference between Oriental costs and Italian, between Italian and American, in each case is much less than might have been expected.

With a grain of salt therefore must be taken claims of the great reductions in agricultural costs which can be effected by the substitution of modern machine technique for primitive methods. Simply in the saving of direct labour, the results may be impressive. Thus in the U.S.A.[1] the number of man-hours of labour required per acre for all processes of cultivation and harvesting was estimated as follows:

	Hand Methods (1850 and earlier)	Best Machine Methods known in 1895	1924 (Actual Farm Average)	1924 (Best Machine Methods then known)
Maize* .	182·7	27·5	37·8	30·0
Cotton .	167·8	78·7	118·5	45·0
Hay . .	21·1	3·9	10·7	1·6
Potatoes .	108·9	38·0	90·4	50·0
Wheat .	62·4	3 1	15·5	1·6

* Recent estimates in *Monthly Labour Review*, September 1938 and January 1939, of the number of man-hours worked on the farm per acre of maize show.

1909–13 . . .	28 7	1927–31 . . .	23 3
1917–21 . .	27 6	1932–36 . . .	22 5

and per bale of cotton (containing 478 lb. of lint):

1907–11 . . .	271	1927–31 . . .	238
1917–21 . . .	275	1933–36 . . .	218

But such figures are found to be spurious when we take into account costs other than direct labour. A comparison showing costs other than labour is obtained from some Argentine farm accounting tabulations. Reducing the data to U.S. dollars and acres, we find that in a district in Argentine where wage rates are about the average, with a yield of 12 quintals per hectare[2]

[1] *I.L.R.*, vol. 23, p 336, and vol. 25, p. 525.

[2] I.e. 17·8 bushels per acre. One peso at the date to which the figures refer (1923–24) was worth $0·345.

(as against the general average for the Argentine of only 8·7 quintals per hectare):

	Per Acre			
	Man-Days	Labour Costs, $	Other Costs, $	Total Costs, $
Harvesting with reaper and binder	0·69	1·69	3·33	5·02
Harvesting with combine . .	0·38	0·98	2·25	3·23

Though other costs fall, they do not fall so rapidly as labour costs, and in the case of combine harvesting these costs predominate.

But there is one very important economic feature about combine harvesters. That is, that the costs per acre scarcely rise if the yield of wheat per acre rises. This is not the case with the older methods of harvesting. Thus costs for the same district as specified above, on lands only yielding 8 quintals per hectare or 11·9 bushels per acre, were:

	Per Acre			
	Man-Days	Labour Costs, $	Other Costs, $	Total Costs, $
Harvesting with reaper and binder	0·48	1·18	2·74	3·92
Harvesting with combine . .	0·38	0·96	2·21	3·17

That with a combine harvesting costs are virtually the same with a heavy crop per acre or a light, will in future give wheat producers a stronger incentive to obtain high yields per acre.

This consideration doubtless stimulated a German investigation into the costs of using combines in Germany on the assumption of a yield of 30 quintals

per hectare. The estimated costs in dollars per acre were :

	Interest and Depreciation	Labour	Other Harvesting Costs	Threshing	Total
Harvesting with binder :					
Argentine .	0·68	3·04	0·70	2·68	7·10
Germany .	0·58	1·85	2·75	4·82	10·00
Harvesting with combine :					
Argentine .	1·82	1·58	0·75	. .	4·15
Germany .	2·69	0·77	1·92	. .	5·39

An official estimate made in Canada showed that the use of the combine has reduced harvesting costs from 17 to 9·3 cents per bushel, or from \$3·08 to \$1·68 per acre. For South Africa the estimated costs of harvesting by the two methods were 22 cents and 11 cents per bushel, or \$1·87 and \$0·93 per acre. Both Canadian and South African costs per acre are lower than those of the Argentine. Wages in the Argentine (at the time of the investigation) were about \$2·5 per day.

The reader may by now be prepared for the result (which would otherwise come as rather a shock) of Professor Buck's calculations as to the possibility of replacing present Chinese methods of cultivation by tractor farming. He found the present methods definitely more economical than the use of tractors.

	Chinese Dollars
First cost of tractor and plough . .	2600
Depreciation, interest and repairs . .	907 per year
Minimum overhead cost (assuming tractor fully shared between different users) .	4·75 per hectare ploughed

Therefore operating expenses per hectare for ploughing by tractor :

	Chinese Dollars
Kerosene . . .	3·78
Lubricants . . .	1·4
Labour . . .	0·5
Overheads . . .	4·75
	10·43

Whereas at the present time land can be ploughed by buffalo teams at a cost of only $4 per hectare.

In quite a different field, possibly, there may be considerable scope for the use of tractors in China. This was suggested by Dr. O. E. Baker,[1] namely, the cultivation of the huge areas of land in China now unused. Out of 700 million acres of potentially cultivable land, only 190 millions are actually used. The remainder is semi-arid and would not provide even a bare subsistence for man and beast if cultivated by ordinary Chinese methods. Dr. Baker suggests that the winning of light crops from this area by tractor cultivation (provided steps were taken to check erosion) would be an economic proposition, though the replacement of animal power by tractor in the densely populated and fertile valleys would not be.

It is indeed a completely mistaken view to think that the question of whether or not the "tractorisation" of agriculture will be economic will depend on the amount of direct labour saved, or even upon the relative prices of labour and fuel. As Jasny has shown in a most interesting investigation,[2] the question of whether horse or tractor will prove more economical depends on a most complex balance of economic forces.

Of predominant importance is the intermittency or constancy of work through the year. The following table shows, for work of varying intermittency, average cost in cents per horse-hour, and the cost of getting the same

[1] *American Economic Review*, 1935, p. 708.
[2] Farm Economics Association, December 1927.

amount of work performed by a 10-11 h.p. tractor under American conditions.[1] Wages of the ploughman or tractor-driver are included in each case :

	Number of Hours per Year :							
	200	400	600	800	1000	1200	1400	1500
Average costs, horse	30·5	18	14	12·5	11·0	10·0	9·5	9
Average costs, tractor	13·0	11	10	10·0	9·5	9·5	9·0	9

Intermittent work, in other words, is always dearer than steady work, but the rise is much less in the case of tractors than of horses, because laid-up tractors don't eat. The more intermittent the work, the more tractors are worth while. Dr. Jasny estimates that the average American horse only works 495 hours per year, and that on practically no farms do they work more than 1000 hours per year. The whole of American farming, therefore, apparently lies within the horse-replacement zone. In Canada the average number of hours' work per year may be even less, and Dr. Jasny estimates that in Australia, Argentine and Russia the number of hours' work per year is similar to that in U.S.A. It must not be assumed, however, that the whole of these countries are in the horse-replacement zone. Of the cost of horse-labour in America, the cost of feed and bedding represents nearly 60 per cent when 800 hours are being worked, and an even higher percentage where the work is more intermittent. In Australia and the Argentine costs of feed and bedding are less than half what they are in U.S.A. owing to abundance of pasture at low rentals. Feeding costs in the Corn Belt in U.S.A. are only half what they are in the Cotton Belt or in the North-East :

[1] For 1937, by which date costs had risen considerably, Paul Williamson (*Farm Economics*, May 1939) estimates the cost of a two-horse team doing 716 hours' work per year at $266 and of a tractor doing 436 hours' work at $221. These are the average amounts of work found to be performed per year in New York State. He estimates that the tractor will do as much in 10 hours as the two-horse team in 12 hours.

but in this case the intermittency of farm work in the Corn Belt still leaves tractors more profitable.

Of the cost of tractor work, 42 per cent represents the cost of kerosene and lubricants. In Australia and the Argentine, which are distant from sources of supply, these costs will be about 25 per cent higher than in U.S.A., owing to transport and tariffs. This will therefore raise tractor costs as a whole by about 10 per cent, while cheaper feed will lower horse costs by 35 per cent. Therefore in Australia and Argentine the boundary of the zone of horse-replacement will come down to about 350 hours per year. The tractor still is more profitable for highly intermittent work, but not for the usual run of work. The balance is further shifted in the horse's favour in Australia by the economy of labour in harnessing, etc. Teams of ten horses are usual, to prepare which for work requires two hours of labour, whereas in Europe an hour of labour is devoted to preparing two horses for work.

In Europe (as in China) steady work throughout the year is generally available for draught animals. In Germany Jasny estimates an average of 2000 hours' work per year for the average horse, at which figure it is far beyond the reach of tractor competition.

An interesting exception, however, is found in Switzerland, where for a variety of reasons pasture rents are high and feed is very dear, about two and a half times the cost in U.S.A. This raises the total horse costs by 90 per cent, while tractor costs are only moderately higher than in the U.S.A. We thus get the paradoxical situation that Switzerland with its tiny mountain farms is one of the most tractorised regions of Europe, rather than the level plains and comparatively large farms of North Germany or Eastern England.

Jasny believes, however, that these conditions, which offer steady work for a horse all the year round, only arise where a large proportion of the arable land is devoted to fodder crops, particularly root crops, and that such farming is only likely to be found in low-wage

countries. Indeed it is historically true to say that "oats and turnip" farming in England grew up at a time when human labour was cheap and horse-hours valuable,[1] and there was every reason for wishing to provide better utilisation throughout the year. In the newer countries comparatively little labour is devoted to the production of uneconomic feed crops, and the density of settlement is being kept low so that ample natural pastures are available. The percentage of arable land devoted to turnips, mangels, swedes and fodder beans and peas is 6 per cent in Germany and 10 per cent in England (it was 16·8 per cent in England in 1913), while these crops are virtually unknown in U.S.A., Canada, Argentine, Australia and New Zealand.

High wages may therefore act as an incentive towards mechanisation in agriculture, not directly, but by discouraging the growth of traditional fodder crops, with the consequential "partial unemployment" of horses. But whether soil fertility can be conserved and improved under rotations of cash crops and green feed only, with the disappearance of the traditional turnip, is a question requiring deeper and more far-sighted study than it has yet received.

High agricultural productivity per unit of labour requires of course more capital than does low productivity. But there is little correlation between the amount of capital and production per head. The high productivity of the Argentine, Australia and New Zealand is not associated with any very heavy capitalisation, and the most heavily capitalised agriculture is that of Great Britain. Taking Lord Stamp's figures given on p. 389, converting them to averages per head of the agricultural working population, we obtain the following figures of agricultural capital per head of agricultural working population, expressed in I.U.'s for 1913 (no more recent comparative figures available):

[1] McCulloch in 1837 estimated the value of a farm horse's keep for a year at £40 — far more than a man's wages at that date.

Great Britain	1710	France	565
Argentine	1600	Sweden	540
Australia	1430	Spain	285
Canada	1410	Italy	215
U.S.A.	1130	Roumania [1]	200

It appears that to some degree the new methods and lighter density of settlement in the new countries represent an economy of both labour and capital.

Dr. Ruston [2] made an analysis of the accounts of a large number of farms in Yorkshire over the period 1921–29 and analysed the accounts to show separately the position of the most and least successful farms, in respect of capital, labour and other factors. He found that the best farms averaged £14·5 per acre capital, and the worst £13·0. But the best farms employed 3·02 men per 100 acres and the worst only 2·34. The best farms therefore employed definitely less capital per man than the worst farms, and more men per acre. In this case it appears that a good farmer is one who obtains a given output with economy of labour, of capital and of land; not one who substitutes one for the other.

In the same way it is sometimes suggested that economies in production are increasingly obtained as the size of farm increases. Dr. Carslaw [3] in England has obtained evidence to show, measuring the efficiency of production by the ratio gross output per unit of labour, that efficiency increases with increasing size of farm up to farms with gross output of £1800 per year, and from that point remains constant. In the discussion of Dr. Carslaw's paper, Dr. Neyman quoted some results obtained from Polish farm accountancy statistics by a method of multiple correlation analysis devised for this purpose (which will find, it is to be hoped, wide use). Analysing the effects of various factors on the net income of farms, extraneous variables being held

[1] For 1932. Based on figures given by Manoilesco (*Weltwirtschaftliches Archiv*, July 1935), showing a farm capital (excluding land values) of 498 milliard lei with an occupied agricultural population of 4 millions.

[2] *Agricultural Economics Society Proceedings*, 1929.

[3] *J.R.S.S.*, 1935, pp. 617, 618.

constant, he showed that the investment of an additional 60 zloty in cattle would increase net annual income by about the same amount (40 zloty) as would the purchase of an additional hectare of land, whose price would be 2000 zloty (£48). To increase the size of farms is clearly far less remunerative than to increase their capitalisation in livestock, and the high price of land under these circumstances can only represent an irrational land-preference on the part of the Polish farmer. Attempts are being made to educate him out of this.

Indeed both Danish[1] and Swiss[2] figures are available to show that the optimum productivity of peasant farms, in both countries, is found in the size-range 15-30 hectares. After imputing wages to the occupier and his family for labour performed, the average percentage rate of return on capital was found to be :

<table>
<tr><th rowspan="2"></th><th colspan="7">Size of Farm in Hectares</th></tr>
<tr><th>3-5</th><th>5-10</th><th>10-15</th><th>15-30</th><th>30-50</th><th>50-100</th><th>100 and upwards</th></tr>
<tr><td>Switzerland .</td><td>0·55</td><td>0·16</td><td>0·76</td><td>1·13</td><td colspan="3">0·60</td></tr>
<tr><td>Denmark .</td><td colspan="2">0·60</td><td>1·15</td><td>1·75</td><td>1·55</td><td>1·60</td><td>0·90</td></tr>
</table>

The average level of productivity in Denmark was higher, but produce was sold at world prices, while in Switzerland all produce is heavily protected. However, this is unlikely to affect the conclusion that for European peasant farming the optimum return is obtained from a holding of less than 30 hectares (75 acres), and for England at a gross output of £1800, or about 150 acres. In New Zealand there is clear evidence (from the inquiry into dairying referred to above) of increasing efficiency with increasing size of business up to the largest farms yet attained : but it will be seen that the largest farms still only represent 50-60 acres used for dairying.

[1] Official Farm Accounting Statistics, average 1931–33.

[2] Bauernsekretariat, 1932–33.

Size of Milking Herd (Number of Cows)	Butter Fat produced per Man-year of Labour, lb.	Acreage used for Dairying
Under 10	2004	16·5
10–20	2190	27·2
20–30	3006	35·5
30–40	4028	41·9
40–50	4533	45·2
50–60	5130	48·7
60–70	5652	49·8
70–80	6051	51·8
80–90	6100	51·9
90–100	6315	51·2
100–120	6452	51·9
120–140	6444	50·2
140–160	6522	50·6
160–180	7044	58·5
180–220	7097	53·5
220–260	5538	47·2
260–300	..	..
Over 300	7576	52·0
Average .	4540	43·1

It is interesting to notice that efficiency continues to increase with increasing size of herd, but the acreage used for dairying remains at about 50. Nearly all of the small herds shown represent only part-time activities.

For the nine statistical regions into which the U.S.A. is divided, a very valuable comparison of capital, land values and net output per worker has been made by Black.[1] Net income is determined from gross farm production less the cost of feed, fertilisers and depreciation and maintenance of buildings and machinery. Annual wages are computed from monthly wages of farm workers living-in with an addition of $10 per month for the value of keep. Statistics are also included of average factory wages in each district, which vary widely. Low factory wages in any district may on the face of it be either a cause or a result of low farm wages.

[1] American Academy of Political Science, November 1936.

	Average of Factory Wages and Salaries per Annum (1929), $	Farm Wages (1925–29), $	Per Worker occupied, $				
			Land Value (1930)	Farm Capital (1930)	Net Income produced (1929)	Do less Wages and 5 per cent on Capital (i.e. Economic Rent)	Economic Rent as per cent of Land Value
East South Central (Kentucky, Tennessee, Alabama, Mississippi)	1060	406	1120	800	490	44	3 9
South Atlantic	1040	456	1720	1420	610	83	4 8
West South Central (Arkansas, Louisiana, Oklahoma, Texas) .	1220	437	2280	1040	680	191	8 4
New England	1390	705	1940	3390	780	−95	−4 9
Middle Atlantic (New York, New Jersey, Pennsylvania) .	1620	665	2220	3730	860	9	0 4
East North Central (Ohio, Indiana, Illinois, Michigan, Wisconsin) .	1640	608	4100	3380	960	183	4·5
Mountain .	1530	725	4860	3060	1350	472	9 8
West North Central (Minnesota, Dakotas, Kansas, Iowa, Missouri, Nebraska)	1420	610	7190	3930	1360	554	7·8
Pacific . . .	1640	757	6980	2690	1370	479	6 9

In the industrial zones (Middle Atlantic and East North Central) and in the more recently settled country (Mountain and Pacific) high industrial wages pull up farm earnings to a level of $700-750, beyond which for some reason they do not rise, even in the most prosperous areas. In these areas much more capital is used per unit of labour than in the low-wage zone, and with increasing capital net output per head rises. Here again, however, recency of settlement seems to be a more powerful factor making for high net output per head (Mountain, West North Central and Pacific) than high capitalisation (East North Central, Middle Atlantic, New England).

In the last two columns is calculated the amount of economic rent per worker. The low-wage zone has a low productivity, yielding little surplus, which is highest in the newly-settled zone. The last column gives a very approximate confirmation of the doctrine that land values merely represent the capitalised value of the net surplus which the land can produce. In the oldest

settled zone (New England and Middle Atlantic) net productivity scarcely suffices to pay wages and 5 per cent interest on capital, leaving no surplus, but nevertheless the land continues to maintain its value, possibly for non-economic reasons.

A more detailed analysis along these lines for smaller areas might possibly yield more valuable results.

CHAPTER VIII

THE PRODUCTIVITY OF SECONDARY INDUSTRY

Tables are prepared in Chapter X in which, starting from data of the average real income per head, measured in international units, for a number of countries, calculations are made of the average real incomes enjoyed by primary, secondary and tertiary producers in each country, on the basis of their relative money incomes expressed in the currency of the country. These tables will only give a valid comparison of the actual quantity of goods and services produced by primary, secondary and tertiary producers in various countries, in so far as the relative prices of primary, secondary and tertiary products are the same in each country. Thus in France the table indicates a production per head of primary producers of 500 international units. In France, however, the wholesale price of primary produce is maintained at a high level relative to prices of other goods and services by tariffs and in other ways, and this figure of 500 units exaggerates the true productivity of French primary producers. The figure for average income produced by primary, secondary and tertiary producers taken together, however, is correct, having been calculated, after a comparison of the whole cost of living in France, with that prevailing in other countries; and it therefore follows that the computed figures for real income per head produced in the above calculation must be too low for either secondary or tertiary production. In the same way, for example, in Australia, where the prices of secondary products are maintained at high level by means of tariffs, the figure of 1461 international units exaggerates the true productivity of secondary producers, and as a result either the primary or the tertiary figures are somewhat understated.

The figures [1] obtained in Chapter X for real income per head of secondary producers are as follows:

	I. U.		I. U.
U.S.A. (1935)	1728	Norway (1934)	1123
Australia (1935-36)	1461	Sweden (1930)	1109
New Zealand (1935-36)	1653	Japan (1934)	959
France (1930)	1373	Germany (1928)	810
Great Britain (1930)	1151	Italy (1928)	471

In drawing conclusions from the above table it must be noticed that craftsmen and small workshop producers have been included with secondary producers in Germany and Italy, and not in Norway or Japan, the reason being that industrial statistics in the two latter countries do not cover their activities. In Japan these small workshop producers and craftsmen outnumber enormously the employees in large-scale factories, and if the two were averaged together the figure would fall to about 450 units. In Norway also there would be a substantial drop in the figure. The figures for other countries purport to include all or virtually all the secondary producers.

It is possible to make a more direct and careful comparison between countries on the basis of industrial production statistics, provided we can obtain some indication of the relative prices of finished manufactured goods in different countries. Most manufactured goods are, at any rate potentially, the subject of international trade, and therefore we would not expect such wide variations between their prices in different countries as we would expect to find among tertiary services. If any country is an exporter of manufactured goods on a substantial scale and of a substantial range, this may be taken as *prima facie* evidence that wholesale prices of manufactured goods in that country are not out of accord with what might be called the world price level

[1] From the formula

Real income per head of secondary producers

$$= \text{Real income per head of whole community} \times \frac{\text{Money income per head of secondary producers}}{\text{Money income per head of whole community}}.$$

(unless we have evidence that industries in that country are highly cartellised and maintaining a policy of differential prices).

So far as other countries are concerned, use has been made of the investigations of the Economic Section of the League of Nations into the relative levels of tariffs prevailing over a representative range of manufactured goods in the year 1925.[1] For this reason the year 1925 has been taken as a base, and prices prevailing in the U.S.A. (which country at that date was exporting practically every type of manufactured commodity) taken as equivalent to world prices. For Australia, where the difference between internal and world prices of manufactured goods is particularly marked, use was made of the investigations of an officially appointed committee of economists [2] who made a careful estimate of "excess cost of protected secondary production".

A convenient summary of industrial statistics for a number of countries is given in the international section of the *German Statistical Yearbook*. In the table overleaf, the figures are calculated for a number of countries showing net output per head reduced to a world price level.

GREAT BRITAIN. — Real output per head at 1930 prices calculated on p. 287 below. Average value of exports, which may be taken as an index of prices of manufactured goods in Great Britain, fell 17·5 per cent between 1925 and 1930. In 1925 British prices of manufactures are assumed to have been on the average 5 per cent above world level (Tariff Level Index).

IRELAND. — Assumed price levels: 1926 = 105; 1929 = 100; 1931 = 90.

NORWAY. — Production statistics began in 1927. Prices at that date assumed to have been 25 per cent above world level and calculated for subsequent years on basis of change in internal wholesale prices of manufactured goods.

ESTONIA. — Manufactures in this country are largely the processing of primary products for export and prices are assumed to have been at world level in 1925. For subsequent years a price index is

[1] Published by the League of Nations under the title of *Tariff Level Indices*.

[2] *The Australian Tariff: an Economic Inquiry*. Melbourne, 1929.

calculated on the basis of movements in the wholesale prices of imports.

ROUMANIA. — Industrial production figures are available from 1929, for which date prices are assumed to have been 28 per cent above world level. Subsequent movements of price index computed from index figures of a limited number of industrial products.

HUNGARY. — Prices assumed to have been 27 per cent above world level in 1925 Movements since that date computed from index figure of prices of industrial goods.

NET OUTPUT PER WORKER OR PERSON AT AMERICAN 1925 PRICES

(Figures $)

Year	Great Britain *	Ireland	Hungary	France	South Africa *	U S.A.	New Zealand *	Australia	Estonia	Norway	Roumania	Canada *
1924	1010		608		950	..	1750	1430	.			2520
1925	.		570		990	3200	1640	1510	545	.		2500
1926	.	1190	705	.	1050	.	1750	1550	582		..	2660
1927			715		1170	3480	1840	1540	630	1670		2840
1928	.	.	740		1205	.	1840	1580	710	1660		3020
1929	.	1290	775	.	1270	3840	1900	1650	702	1730	595	3220
1930	1125		865	922	.		1870	1450	810	1720	750	3250
1931	.	1440	900	.		3880	2010	1310	870	1850	780	3670
1932	.		880	.		.	2100	1280	860	1810	810	3520
1933	.		830	.		3420	2130	1250	980	1770		3070
1934	.		.	.	.	.	.		992	1700		3180
1935	.		..	.	.	3215		.				.
1936	1330	..	.	.	.		.			.		.

* Per person employed Others per operative (manual worker) Ratio of operatives to persons employed ·

Great Britain	1924	89 5
	1930	88 2
Canada, 1929		85 8
New Zealand, 1935–36		84 8

CANADA. — Prices assumed to be equal to American in base year. Subsequent figures calculated from price index of finished goods.

U.S.A. — Price index of finished goods used to give the index figures of each year other than 1925.

SOUTH AFRICA. — Excess price of protected manufactured goods in 1933 calculated at £3·69 millions (C. S. Richards, *South African Journal of Economics*, 1935). Prices in other years computed from wholesale price of imported goods.

AUSTRALIA. — Special index number calculated applicable to price of fabrication (i.e. price of finished manufactured goods with deduction from index number to allow for changes in price of raw materials). Base figures are those for 1926–27, for which year the original calculation of excess costs was made.

FRANCE. — Figures given in *Enquête Industrielle*, 1930, together with official estimate for unrecorded production, giving net output per worker of 25,700 francs or 1008 dollars. Average tariff level given as 25 per cent in 1930, giving price level for that year of 109 on the basis of American prices in 1925.

The highest productivities are shown by the U.S.A. and Canada. The fall between 1931 and 1933 was due, as will be shown presently, to short-time working, and output per worker-hour continued to increase.

Next in order of productivity are found New Zealand and Norway. In both of these countries a limited range of industrial activities is followed, again largely concerned with the exploitation of certain primary products, and a high level of efficiency is reached. High productivity is also shown by the figures for Ireland and South Africa (the latter not being available after 1929). The situation in Australia is very remarkable; a marked rise in productivity having been shown up to 1929, after which date there has been a steady decline. It is almost certainly the case that this decline in productivity is associated with the expansion since 1929 of industrial production into a number of new fields, under the shelter of heavy tariff and exchange protection. These new fields are proving considerably less remunerative than the older fields of industrial activity. It remains to be seen whether this disparity is temporary or permanent.

For Great Britain it is possible to calculate a figure up to 1936, showing a marked increase over the last twelve years, though still considerably below the net productivity obtained in a number of other countries. An exceedingly steep rise is shown by the figures for Estonia, which is now approaching a level not very different from that prevailing in larger industrial countries. For Roumania a distinct rise is also to be noted.

A considerable discrepancy is to be noted between figures for the U.S.A. given here and those given by Dr. Kuznetz for average net income per head in manufacturing.

"Value added by Manufacture" (the basis of the above statistics) was $31,062 millions in 1929 (excluding railway repair shops), whereas Dr. Kuznetz's figure of income produced was $19,308 only. The difference represents depreciation [1] (about $2500 millions), writing down of inventories, and payment for a wide variety of services (legal, accounting, postal, etc.) not deducted in computing value added by manufacture. A somewhat similar situation prevails in Canada. In Great Britain, on the other hand, depreciation allowances [2] amount to only £75 millions, or only some £10 per head of the population engaged in industry. The only other countries for which we have information about depreciation are Germany and Australia. "Replacement Charges" in German manufacturing industry [3] amounted to 2190 million marks in 1928, i.e. on about the same scale as Great Britain. Depreciation in Australian manufacturing production [4] amounted to £8 millions, or £18 per person engaged. Allowing for the higher prices of machinery and parts, this is not markedly different from the figure for Great Britain.

It appears to be the case that, once industrial production has passed a certain level of output per head, say about 2000 international units per worker, rapidly increasing charges for depreciation and for various subsidiary services are encountered. This must not be taken to imply in any way, however, that there is necessarily any slowing down in the rate of progress at this stage. The analysis of the American figures given below certainly makes this clear. The introduction of machinery and technique on the present American scale, in other words, involves enormous charges for administration and depreciation; but the evidence goes to show

[1] Corporation Income Tax Returns. Some addition should be made for non-corporate manufacturers.

[2] Wear and tear allowances shown in Report of the Board of Inland Revenue with some reduction for allowances referring to transport and shipping.

[3] Including electricity, gas and water supply. Figures from *Konjunktur-Statistisches Handbuch.*

[4] Production Bulletin No. 29, Table 144.

that these methods of production yield sufficient return to meet these costs and leave a considerable surplus available for enhancing the standard of living of the manual workers.

It may be remarked in this connection that the present charges for depreciation in British industry, trifling as they seem in comparison with the corresponding charges in America, are exceedingly high in relation to those which prevailed thirty years ago. No important changes having occurred during the period in the methods of assessing wear and tear allowances, or in the percentage rate of depreciation allowed on any given type of machinery, the following are the figures of the aggregate of wear and tear allowances on machinery made by the British Inland Revenue over a period of years :

	£ million		£ million
1901–2	11·5	1920–21	51·7
1907–8	20·0	1924–25	55·9
1913–14	34·9	1934–35	105·0

Both temporal and spatial comparisons indicate that depreciation will become a question of rapidly increasing importance both in industrial management and in economic thinking.

The figures which we have analysed above represent the closest approximation which can be obtained towards an international comparison of industrial productivity. Deductions for depreciation, though considerable in the case of U.S.A. and Canada, are probably $50 per head or less in the case of most other countries.

Professor Taussig, seeking for information confirmatory of his doctrine of comparative costs in international trade, assembled all the available data comparing physical quantities of output per worker from the 1907 Census of production in Great Britain and the 1909 Census in U.S.A.[1] As can be seen, this was only possible for a limited number of industries. Certain data were also collected from other countries.

[1] *Quarterly Journal of Economics*, 1925.

PHYSICAL OUTPUT PER WORKER

	U S A	Great Britain	Germany	Malaya	Sweden	Belgium	Japan
Tin plate, tons	100 4	25 6		..	..	.	.
Cement, tons .	395	194	.		.		..
Sugar, tons	165	87	.	.			
Flour, tons	325	212	.		.		
Butter, £ net output at given price level	242	125		.			
Ice, tons	535	490		.		.	
Bricks, thousands	141	.	60	14		.	
Beer, hectolitres	1000	.	614	..		.	.
Window glass, sq. metres per day .	21	.	..	..	.	..	..
Do , handblown .	16	.	..	..	10	11	.
Bituminous coal, tons	724	275	284	.	.	143	..
Cotton yarn, lb. per day ; 20's	414	..	.	..	..	.	104
Cotton cloth, yds per day .	450	..	.	.	.	..	145
Do , automatic looms .	1100	..	..	.	..	..	

In all countries great advances have been made since the period to which Professor Taussig's data refer, but they provide an interesting collection of data for the world of that period. The differences of physical productivity between Britain and the U.S.A. seem to be very marked in every industry examined, and not correlated with comparative size of industry.

We may now turn to such information as is available concerning the rate of growth of industrial productivity over a period of years. The following calculation, taking the year 1920 as base, can be made for the U.S.A. Sources are discussed below.

First column from data calculated by Ezekiel, American Academy of Political Science, November 1936, giving average production per head in manufacturing industries from 1870. Account appears to have been taken of changes in hours.

Second column from calculations by Professor Douglas, *Real Wages in the United States*, p 547, giving relative output per man-hour in manufacturing. These figures relate to average number of hours in the standard week rather than in week actually worked. It will be seen, however, that for the years in which they overlap with more complete data only slight variations are to be noticed.

Third column from Weintraub, *Journal of the American Statistical Society*, 1932, p. 387.

REAL OUTPUT PER WORKER-HOUR IN MANUFACTURING INDUSTRY

Year	Ezekiel	Douglas	Weintraub	Survey of Current Business (Linked to Douglas on 1925 Base)
1870	49·0	..	..	..
1880	57·0	..	..	..
1890	71·0	..	..	..
1899	..	75 0	.	..
1900	76·5	72 0	..	.
1901	.	77·5	..	..
1902	..	79·5	..	.
1903	.	78·0	..	.
1904	..	82·0	.	..
1905	..	89·5	..	.
1906	..	90 0	..	..
1907	..	88 0	..	..
1908	..	83·5	..	.
1909	..	89·5	..	.
1910	89·5	89 0	..	.
1911	..	85·0	..	
1912	..	94·0	.	..
1913	..	97 0	..	.
1914	..	91·5	.	.
1915	..	99 0	..	..
1916	..	100·0	.	..
1917	..	94·0	..	..
1918	.	92·0	..	.
1919	..	94 0	..	..
1920	100·0	100·0	100·0	..
1921	.	99 0	102 5	.
1922	.	118 0	118 1	..
1923	.	120 0	120·8	120 6
1924	..	122·5	125 8	125 1
1925	..	133 0	133 2	133·1
1926	.	..	135·1	134 5
1927	.	..	136 8	136 7
1928	.	..	145·3	144 0
1929	.	..	147·6	146·2
1930	..	..	146 8	143·8
1931	..	..	159·4	152·0
1932	.	..	..	153·7
1933	..	.	..	169 3
1934	.	..	..	164·1
1935	.	..	..	172 8
1936	..	..	..	178 8
Nov. 1937	.	..	..	176 3

Figures in fourth column computed from data published in Survey of Current Business. Output per man-hour is computed from the formula :

$$\text{Industrial Production} \div \frac{\text{Pay Rolls}}{\text{Average hourly earnings in manufacture}}.$$

In this way account is taken of changes in the average number of

hours worked, though it is not safe to use this formula over long periods owing to possible changes in the relative numbers of different types of labour employed. Results obtained from this formula are linked to Douglas's figure for 1925, which also agrees exactly with Weintraub's.

The rate of increase between 1870 and 1880 was 17 per cent, between 1880 and 1890, 24 per cent. But from that date there appears to have been some slowing down in the rate of average increase per decade. From 1900 to 1920 there was only an increase of a little over 30 per cent in the two decades. But from 1920 to 1930 there was an increase of nearly 50 per cent in average production per man-hour, and of 16 per cent in the seven years from 1930 to 1937. The irregularity of the increase is very marked. Thus from 1900 to 1906 there was a 25 per cent increase, the 1906 level of productivity not being regained again until 1912. The year 1922 shows an astonishing increase after the sudden and violent depression of the previous year. From that date, however, the improvement in productivity has been fairly continuous. A calculation in Chapter X of the change in *purchasing power of the average income of a manufacturing producer* in the United States between 1900 and 1935 (on the assumption that he worked a 48-hour week) shows a rise from 1326 to 2410 international units, or 82 per cent. Our figure above for absolute production per man-hour has risen from 72 to 172·8 units, or 142 per cent. This discrepancy brings to light several considerations, of which the foremost is the large fraction of output which now has to be set aside to meet depreciation, etc., though the factor of depreciation charges was of course not absent in the earlier year. We must not lose sight, however, of a further possibility, namely, the possible increasing relative importance of industries producing quality goods of various kinds, whose movements are not adequately shown by index numbers of the volume of production. Against this must be set the fact that the terms of trade have moved somewhat to the advantage of manufacture and against primary

production. This factor would in the first instance have the effect of raising the figure of the purchasing power of the income of the average manufacturing producer, relative to the figures of his physical output per man-hour. It is clear that figures of physical production per man-hour can only be used over limited periods, and require to be periodically checked against wider data.

The following figures are available for Germany covering the period 1913 to 1937 :

Year	Production	Man-hours Worked	Production per Man-hour
1913	98·0	105·5	92·8
1925	81·1	92 9	87·3
1926	77·9	79 0	98·6
1927	98·4	97·5	100·9
1928	100 0	100·0	100·0
1929	100·9	94·4	106·6
1930	88 9	78·9	113·5
1931	72·8	62·6	117·3
1932	58·7	50·5	117·1
1933	65·5	58·0	113·8
1934	83·3	76·0	110·3
1935	95·8	82·8	116·7
1936	106·7	91·8	117·3
1937 Jan. to Oct.	115 0	99·5	116·7

Data from 1925–33 given in Bulletin of the Institute of Konjunktur, 21st November 1934. Production figures have subsequently been somewhat revised. Bulletin for 1st December 1937 gives revised figures of average number of hours worked from 1929 to 1937. Volume of production in 1913 calculated from data given in Bulletin for 23rd January 1935. Aggregate hours worked in 1913 are calculated from Census data.

The index figures given above for man-hours worked check satisfactorily against the results of the 1925 and 1933 Censuses, as can be seen from the following table :

Year	Numbers occupied in Industry and in Work, excluding Unemployed, millions	Average Hours per Day from Industrial Statistics	Average Hours worked per Day, millions
1933	8·63	7·16	61·8
1925	12·88	7·66	98·6
1913	11·2	10·0	112·0

In the disorganised conditions immediately following the inflation, output per worker-hour was low; but the pre-war level had been recovered by 1926. From 1926 to 1929 there was a further rise of 8 per cent, and between 1929 and 1931 there was a further rapid rise in average output per worker-hour. This phenomenon (which also occurred in America) has already been noted. During the same period, average output per worker-hour in England and France showed a marked decline. It appears that these divergent movements were due to considerable differences in the structure of industry in the different countries. In France and England the depression caused most factories to lose part of their trade, but not to close down, as a result of which they all worked at higher real cost per unit of output. In Germany and America, where industry is more highly organised, the most costly works were generally closed altogether during the depression, thus raising the average output per worker-hour. In 1931 the German figure of productivity attained a level which it has not subsequently ever passed; though the retention of this level during a period when there was a great increase in the amount of labour employed in industry was no mean achievement. As compared with pre-war years, however, German productivity shows a smaller increase than that of Great Britain or America.

It is possible to apply some check to the above figures from data of net output. A careful estimate of gross and net output in 1928 was made in the course of the general inquiry into industrial production of that year.[1] Figures for gross and net industrial output for

[1] Figures from *Konjunktur-Statistisches Handbuch.*

1936 have recently been calculated.[1] In the following table gross output is revalued by means of the index figure of prices of finished goods, and materials by the index figure of basic industrial products. Net output is obtained by difference. The figures include "hand work" or craftsmen's output as well as that of factories.

	(Milliard marks)		
	1936	1928	1936, revalued at 1928 prices
Gross output	67·5	84·0	88·3
Basic materials	35·0	50·5	50·0
Net output	32·5	33·5	38·3

Real gross output appears to have increased by 5 per cent as against the 7 per cent indicated by the index number of production. But "Real Net Production" appears to have increased by 14 per cent. In this case the discrepancy is clearly due to the use of a smaller volume of basic materials per unit of output. This must not be left out of account in judging the trend of industrial productivity in Germany.

For Great Britain we have the following figures, calculated in a similar way, and all expressed at prices of 1930:

Year	Basic Materials, £ million	Gross Output, £ million	Net Output, £ million	Employment, thousands	Net Output per Head, £ per Annum
1907 (Great Britain and Ireland)	581	1780	1199	7354	163·1
Do., on 48-hour week basis	..	..	..	..	143·0
1924 (Great Britain and Northern Ireland)	606	2092	1486	7979	186·2
1930, do.	647	2286	1639	7899	207·6
1936, do.	706	2880	2174	8400	246·6

[1] Institute of Konjunktur Bulletin, 6th October 1937.

Figures for 1930 from General Report of 1930 Census of Production, inclusive of estimates for small firms not making returns. Basic materials are inclusive of cost of transport and dealing. Figures for 1924 are also quoted there, and figures for 1907 in relation to 1924 are from P. H. Douglas and N. A. Tolles (*Journal of Political Economy*, February 1930). These authors, using a "Fisher" index number, show that the real volume of gross industrial production in Britain in 1924 was 23·5 per cent above that of 1907. Consumption of basic materials in 1936 from revaluation of imports in that year prepared in the *Board of Trade Journal* (January 1937). The following classes were included:

Foodstuffs	Classes A and I
Raw materials	All
Manufactured goods . . .	Classes A, B, C, D, H, I, J, K, L, N, P, Q

Imports in these classes consisted predominantly if not entirely of goods to act as materials for further working. These categories accounted for £457 millions of basic material consumption in 1930, and the 1936 volume of these imports, measured at 1930 prices, was £498·8 millions. The volume of consumption of basic materials as a whole is estimated to have increased in this proportion between 1930 and 1936. Consumption of basic materials in 1924 and 1907 is given in the Final Reports on the Census of Production in those years and is reduced to 1930 values by the Sauerbeck index number.

Firms employing under ten workers were exempt from the obligation to supply returns in the 1930 Census but were nominally covered in the Censuses of 1907 and 1924. The following table gives the figures of the allowances made for exclusion of these small firms.

Year		Net Output, £ million	Employment, thousands
1907 [1]		50·0	500
1924	Returning .	85·1	473
	Not returning .	35·9	207
1930		134·0	758

The volume of gross output in 1924 and 1907 and in 1936 was calculated by the following series of ratios:

Total gross output in 1930	100·0
Gross output in 1936 calculated from index number of industrial production	125·8

[1] See *J.R.S.S.*, 1929, Part II. p. 37.

Gross output in 1930 of firms employing 10 workers or more	91·8
Gross output in 1924 of firms employing 10 workers or more	84·9
Gross output included in 1924 Census returns .	89 5
Gross output included in 1907 Census returns . .	72·5
Gross output including all small firms in 1924 .	91·4
Gross output including all small firms in 1907 . .	77·8

Between 1907 and 1924 average output per worker-hour appears to have increased by 28 per cent. During the twelve years from 1924 to 1936, however, an increase of 32 per cent has been achieved. Though starting from a lower level, this rate of increase is comparable with that observed in the U.S.A.

For measurement of long-period changes in the productivity of British industry, we have Dr. Hoffman's index of the physical volume of output,[1] summarising all available production data as far back as 1713. Figures of the numbers occupied in industry cannot unfortunately be taken back any further than 1841.[2] These earlier figures can be linked to the Census of Production in 1907. Comparing the Census of Population data with the average production for the nine years centring on the Census year, we have :

Years	Numbers engaged in Manufacture and Mining, Great Britain, thousands	Volume of Production (1913 = 100)	Average Working Hours	Net Output £ per Head at 1930 Prices (linked on 1907)	
				Current Hours	On 48-hour Week Basis
1837–45	1934	17·6	65·0	102·0	75·2
1847–55	3132	24·6	62·5	88·0	67·6
1857–65	3629	33·3	60·0	102 6	82·2
1867–75	3885	45·3	59·2	130·6	105·8
1877–85	4217	54·8	55·2	145·7	126·6
1887–95	4790	64·5	55·2	150·8	130·9
1897–1905	5535	76 9	55·2	155·3	135·0
1907	5980	87·1	54·7	163 1	143·0
1908–14	6280	89·4	54·7	159·5	139·8

[1] *Weltwirtschaftliches Archiv*, September 1934.

[2] See p. 186.

Between 1871 and 1907, during which period the productivity per worker-hour of American industry rose by 80 per cent, the British figure rose by only 35 per cent. There was an actual retrogression of productivity in the years 1907–14,[1] while from 1881 onwards the rate of growth had very much diminished. The rapid growth in productivity since 1914 may well be described as the taking of a new lease of life by an apparently moribund industrial organism.

If the economic historian accepts Dr. Hoffman's figures (I for one certainly think that he should), he will see here evidence of the grave retrogression of productivity, with consequent decline of an already wretched standard of living, during the "Hungry Forties". During the next two decades spectacular advances in factory productivity were made, with consequential higher wages and shorter hours.

French Industrial Production

Year	Gross Milliard Francs	Net Milliard Francs	Workers, thousands	Net Output, francs per worker	Price Index (arbitrary base)	Net Output, at 1930 Prices, thousand francs per head
1840–45 (over 10 workers) .	4·167	2·927	1190	1,042	172	3·75
1861–65 :						
Recorded .	9·756	3·430	1783	1,925	..	..
Estd. total	12·000	4·200	2000	2,100	168	7·1
1930 :						
Recorded .	70·8	27·3	1189	22,950	..	..
Estd. total .	250·0	100·0	3892	25,700	618	25·7

For France we are in a curious position of being able to make comparisons between the present day and figures relating to the early years of the nineteenth century, but we cannot make any detailed comparisons

[1] This was first pointed out by Mr. J W. F. Rowe, and commented upon by the present writer (*Economic Journal*, September 1931).

over recent years. Summaries of the results of the industrial Censuses of 1840–45 and 1861–65 are given in the preface to the report on the Census of 1930. Figures of prices of industrial goods are taken from table on p. 106 above. In this case we have a 90 per cent increase in average real output per worker in the twenty years from 1848 to 1861, and a three-and-a-half-fold increase between 1861 and 1930. This rate of increase appears rapid, but can be substantiated by consideration of subsidiary sources of information.

An interesting series showing changes in the volume of output per industrial worker in Hungary since 1913 has been calculated by Prof. Varga :[1]

1913	100	1931	144
1921	74	1932	158
1925	108	1933	154
1927	128	1934	157
1929	136	1935	157
1930	143	1936	150

These confirm the previous calculations and estimates of changes in real income per head, indicating the seriousness of the decline to 1921 and the strength of the subsequent recovery, in spite of the supposed economic disorganisation of Central Europe in this period.

One other country for which a similar calculation is available, comparing the years 1913 and 1928, is Finland.[2] Over this period an increase of 100 per cent in real gross industrial output was accompanied by an increase of 59 per cent in the number of workers — a 26 per cent increase in the output per worker, and a greater percentage increase in output per worker-hour.

For a long time it has been generally believed by economists that the operations of manufacturing industry are carried on under conditions of (in the long period) Increasing Return ; or to define it more precisely, of Decreasing Real Cost. By this is meant that a high output of manufactured goods in general, or of any par-

[1] *I L.R.*, April 1939.

[2] Kovero, *Weltwirtschaftliches Archiv*, July 1932.

ticular type of manufactured goods, can in the long run be obtained at a lower real cost per unit of output than a low output. " Real Cost " refers to the quantities of all factors of production, not only labour, used up in the process of production. In order to obtain a satisfactory measurement of real costs, it is necessary that we should be able to reduce money costs to real units, and also have determinate terms of exchange between the values of different factors of production. These considerations militate against comparisons over very long periods or between countries in widely different circumstances; though, as is shown below, they cause in effect no serious difficulty for comparisons over a period of nearly a century.

If this far-reaching generalisation is true (and we shall show below that, subject to certain qualifications, it is true), we should expect it to determine average real cost per unit of output in manufacturing, or average net return per unit of factors of production employed, not only temporarily but also spatially; that is to say, to throw light on not only changes through time, but differences of productivity in different countries.

Writing in September 1928, in the course of one of the ablest contributions to the subject of industrial economics which has ever been made,[1] the late Professor Allyn Young wrote:

> I have naturally been interested in British opinions respecting the reasons for the relatively high productivity (per labourer or per hour of labour) of representative American industries. The error of those who suggest that the explanation is to be found in the relatively high wages which prevail in America is not that they confuse cause and effect, but that they hold that what are really only two aspects of a single situation are, the one cause, and the other effect. Those who hold that American industry is managed better, that its leaders study its problems more intelligently and plan more courageously and more wisely can cite no facts in support of their opinion save the differences in the results achieved. Allowing for the circumstance that British

[1] " Increasing Returns and Economic Progress ", *Economic Journal*, December 1928.

industry, as a whole, has proved to be rather badly adjusted to the new post-war economic situation, I know of no facts which prove or even indicate that British industry, seen against the background of its own problems and its own possibilities, is less efficiently organised or less ably directed than American industry or the industry of any other country.

Sometimes the fact that the average American labourer works with the help of a larger supply of power-driven labour-saving machinery than the labourer of other countries is cited as evidence of the superior intelligence of the average American employer. But this will not do, for, as every economist knows, the greater the degree in which labour is productive or scarce — the words have the same meaning — the greater is the relative economy of using it in such indirect or roundabout ways as are technically advantageous, even though such procedure calls for larger advances of capital than simpler methods do.

It is encouraging to find that a fairly large number of commentators upon the volume of the American industrial product and the scale of American industrial organisation have come to surmise that the extent of the American domestic market, unimpeded by tariff barriers, may have something to do with the matter. This opinion seems to be forced upon thoughtful observers by the general character of the facts, whether or no the observers think in terms of the economists' conception of increasing returns. In certain industries, although by no means in all, productive methods are economical and profitable in America which would not be profitable elsewhere.

Recapitulating his paper, Professor Young stated in his conclusions as follows :

First, the mechanism of increasing returns is not to be discerned adequately by observing the effects of variations in the size of an individual firm or of a particular industry, for the progressive division and specialisation of industries is an essential part of the process by which increasing returns are realised. What is required is that industrial operations be seen as an interrelated whole. Second, the securing of increasing returns depends upon the progressive division of labour, and the principal economies of the division of labour, in its modern forms, are the economies which are to be had by using labour in roundabout or indirect ways. Third, the division of labour depends upon the extent of the market, but the extent of the market also depends upon the division of labour. In this circumstance lies the possibility of economic progress, apart from the progress

which comes as a result of the new knowledge which men are able to gain, whether in the pursuit of their economic or of their non-economic interests.

Working in association with Professor Young was Mr. G. T. Jones, who, following up Professor Young's suggestions, was able to obtain adequate measurements of changes in " real cost " in several British and American industries over a considerable period. His results are quoted in detail below. In October 1928 the present writer was engaged by Professor Young to act as research assistant in investigating the parallel problem of the spatial comparison between productivity per unit of labour in British and American industries, and made some preliminary investigations into the figures available at that date.

The economic world suffered an incalculable loss in the premature deaths of Professor Young in February 1929, and of Mr. G. T. Jones in a motor accident in France at the end of 1928. The realistic investigation of problems of increasing return has made little progress since that date. Having worked with Professor Young, and having had the melancholy duty of revising and editing Mr. G. T. Jones's manuscripts, the present writer feels it both a privilege and an obligation to pass on, so far as he can, the fruits of the thought and investigation of these two workers.

Comparison of average productivity per unit of labour engaged in industry, between Great Britain and the U.S.A., has been made at various times by the present author. Mr. Goodes has revised the whole of this work and has extended the investigations to cover comparisons of productivity between industries of the U.S.A. and those of France, Canada and Australia, as well as Great Britain.

In looking for statistical confirmation of the existence of increasing returns in industry, the productivity figures of industries were compared both in space and time. Spatial comparisons are furnished by the figures

of output in several countries of a representative list of industries, comparing size of firms or industries and net output per worker in any one country. For temporal comparisons the figures of output for selected industries in one country in fairly widely separated periods are used.

Comparisons in space or time of average productivity per head in any given industry can always, of course, be readily made in terms of net monetary value produced (though even here difficulties arise in the definition of net production and of the costs which are to be deducted). Measurements of changes in real output per head in time, or comparisons of real output per head in different countries, are remarkably difficult. In a few industries whose product is homogeneous such comparisons can, subject to certain qualifications, be made. Where adequate price data relating to finished goods are available the monetary output could be divided by these indexes. As we shall show below, the use of the money measure is a very treacherous guide, and we must therefore confine ourselves to the limited number of cases for which real data can be obtained.

It is also a point of some importance as to whether increasing returns are to be expected with the increasing size of *industry* or increasing size of *firm*, bearing in mind, however, Professor Young's warning in both these connections, and some investigations are made in both these directions.

It was anticipated in the first instance that when the same industries are compared in different countries, some correlation would be shown between average size of establishment and *money* return per worker. This expectation was disappointed. Increasing returns with increasing size of establishment, if they exist, are fully passed on to the consumer in the form of lower prices. We must pursue our investigation by an examination of real returns in certain industries.

Comparison between identical industries in several countries shows that no correlation exists between size

of *establishment* and net output per worker. The relevant figures for forty industries in five countries — U.S.A., France, England, Australia and Canada — were examined. Taking first the size of firm as indicated by average numbers employed, it was found that no correlation existed between size of firm and net output per worker. Interpreting size of firm in terms of average net output per firm, a similar absence of correlation was revealed.

It may next be suggested that, in view of the progressive specialisation of firms within industries, evidence of growth of production should be looked for by comparing size of *industry*, rather than average size of firms within industries, in the countries examined with output per worker. For the comparison of size of industry and net output per worker, the relevant figures for England were, as before, expressed as percentages of those for America. A similar comparison between England and Australia was made, the figures for Australia being stated as percentages of those for England.

If productivity per head increased with size of industry, it would, for example, be expected that, since American industries are almost without exception larger than corresponding industries in England, comparison of the relatives would reveal marked positive correlation. The correlation coefficient yielded, however, was less than 0·1, whilst for England and Australia the coefficient was −0·1. Both results show that, as between comparable industries of the countries examined, relative productivity per worker does not even depend on the relative size of the industries.

One only has to look at the following tables to see the complete absence of correlation. Similar results are obtained, though not given below, in examinations of the Canadian and French statistics, when an attempt is made to obtain correlations between the relative size of industry and relative money net output per worker. It is thus (perhaps it was to be expected) quite impossible to demonstrate in terms of money values (though indirect

U.S.A. — ENGLAND

Output per Worker and Output per Industry

(Crude quotients taken as relatives for correlation analysis)

	Net Output per Worker			Net Output per Industry		
	U.S.A., \$	England, £	Relative	U.S.A., \$ million	England, £ million	Relative
Flour	7,050	460	6·5	191	9·08	4·7
Dairy	5,710	598	10·5	174	5·68	3·3
Sugar	4,950	503	10·2	106	7·57	7·3
Bread	3,940	312	7·9	789	29·83	3·8
Confectionery	3,130	266	8·5	218	16·25	7·4
Explosives	5,930	-357	6·0	44	3·00	6·8
Candles, soaps and perfumes	9,900	680	6·9	268	12·86	4·8
Fertilisers	3,500	370	10·6	73	2·61	3·6
Paints and varnishes	8,060	600	7·4	235	8·63	2·6
Inks	9,100	762	8·4	26	2·0	7·7
Polishes	11,450	653	5·7	31	4·0	12·9
Rubber	3,610	334	9·3	539	14·49	2·7
Paper	3,820	271	7·1	393	13·25	3·4
Painting	10,430	747	7·2	1347	36·25	2·7
Cotton	1,470	115	7·8	626	43·34	6·9
Wool	2,210	174	7·9	324	37·46	11·6
Silk	2,440	168	6·9	319	9·2	2·9
Textile finishing	2,910	-208	7·2	230	18·36	8·0
Lace	2,770	204	7·4	19	2·74	14·5
Hosiery	2,130	169	7·9	443	16·35	3·7
Elastic	3,000	174	5·8	13	90	6·9
Clothing	3,120	173	5·5	1669	47·62	2·9
Hats	2,800	181	6·5	51	4·99	9·8
Umbrellas	2,460	183	7·4	7	·63	9·0
Gas	7,530	378	5·0	324	34·9	10·8
Leather	2,880	290	10·4	144	7·36	5·1
Boots	2,240	185	8·3	504	20·73	4·1
Gloves	2,070	186	9·0	19	1·26	6·6
Furniture	2,700	208	7·7	522	17·0	3·3
Boxes	2,000	190	9·5	61	2·12	3·5
Cooperage	2,150	227	10·6	23	·69	3·0
Iron and steel	6,500	220	3·4	161	3·95	2·5
Wire	3,920	222	5·7	88	4·36	5·0
Tools	3,430	187	5·4	94	3·54	3·8
Cutlery	4,270	196	4·6	64	1·77	2·8
Mechanical engineering	3,950	242	6·1	3052	90·8	3·0
Electrical engineering	4,060	296	7·3	1330	44·83	3·4
Ships	2,850	225	7·9	145	25·92	17·9
Automobiles	4,100	272	6·6	2014	45·38	2·3
Aeroplanes	3,000	317	10·6	44	5·58	12·6
Plate and jewels	3,600	217	6·0	157	4·6	2·9
Cement	5,180	470	9·1	172	4·76	2·8
Bricks	2,300	215	9·3	215	14·66	6·8
China and earthenware	2,380	147	6·2	85	9·52	11·2
Glass	2,960	237	8·0	201	8·29	4·1

ENGLAND — AUSTRALIA

(Relatives on basis England=100)

	Relative Output per Worker	Relative Net Output per Industry
Flour	132	22·5
Dairy	105	6 0
Sugar	109	59·0
Bread	128	17·3
Confectionery	147	20·2
Explosives	107	11·6
Soap and candles	88	11·1
Fertilisers	166	58·0
Paint	112	10·7
Ink	84	26·0
Rubber	157	23 5
Paper	121	13·5
Cotton	188	0·48
Wool	143	7·6
Hosiery	153	18·4
Clothing	109	22·2
Hats	147	20·0
Umbrellas	157	16·2
Gas	217	10·5
Leather	138	20·2
Boots	131	22·2
Furniture	139	17·6
Boxes	178	26·2
Cooperage	163	37·0
Wire	162	28·2
Cutlery	168	4·6
Mechanical engineering	141	8·5
Electrical engineering	98	3·8
Shipbuilding	137	7·2
Autos.	114	15·8
Plate and jewels	144	8·9
Cement	115	61·0
Bricks	160	17·3
Earthenware	225	6·0
Glass	188	18·1

proof may be possible) Professor Allyn Young's proposition that the high productivity of American industry

relative to British or French is explicable simply in terms of size of industry. We are compelled to the conclusion that increasing returns with increasing size of *industry*, if they exist, are also fully passed on to the consumers in the respective countries in the form of lower prices.

But in order to check this hypothesis a further possibility had to be eliminated, namely that the products of certain industries may be sold in a highly imperfect market. Although similar industries as defined in the respective statistical records of the countries dealt with were selected with care, it is certain that the marketing conditions of the corresponding industries in the countries concerned are in many cases very different. Varying decrees of imperfection in the markets for the products of industries in different countries, which are strictly comparable when defined in terms of the physical characteristics of the products, destroys their comparability for the purpose of determining relative net output per head of workers engaged. In these circumstances a valid comparison could be made only between industries the products of which are sold in "perfect" markets. A selection of the "physically" identical industries presumed to sell in perfect markets, however, yielded no more evidence of correlation between output per worker and size of industry than the full range of industries discussed above.

So far our comparisons of the size of industries and output per worker have been between industries, whether of one or several countries. The results, when similar industries of different countries are compared, do not provide any evidence that industry generally operates under conditions of increasing *money* return. These conclusions are confirmed by comparing the industries in any one country. It can be shown, however, that size of firm and productivity per worker within some industries in England increase together; but that in others, the greater proportion of those examined, either the correlation is negative or non-existent.

These comparisons within industries between the size of firm and net output per worker may now be made. The data used for this examination were taken from the Final Report of the Fourth Census of Production of Great Britain, 1930. Size of firm is measured by the average number of persons employed. Output is average net output per person engaged in the specified groups of firms. In the following diagrams figures are plotted for all industries for which they are available.

Firms within an industry are grouped in the report according to average number employed, the brackets ranging from 11-24 to 1500 and over. On the diagrams these groups are measured along the horizontal logarithmic scale.

It will be seen that the character of the curves varies greatly. A classification of the results given below shows that for thirteen of the thirty-four industries examined there was positive correlation between size of firm and net output per head, whilst for five industries the correlation was negative.

CLASSIFICATION OF GROUPS SHOWING SIZE OF FIRM AND OUTPUT PER PERSON EMPLOYED

Class I.—Showing marked positive correlation:
Ice; grain milling; iron and steel tubes; petroleum refining; butter and cheese; fellmongery; seed-crushing.

Class II.—Moderate positive correlation:
Copper and brass; woollen and worsted; rope and twine; tin plate; iron foundries; slate mines.

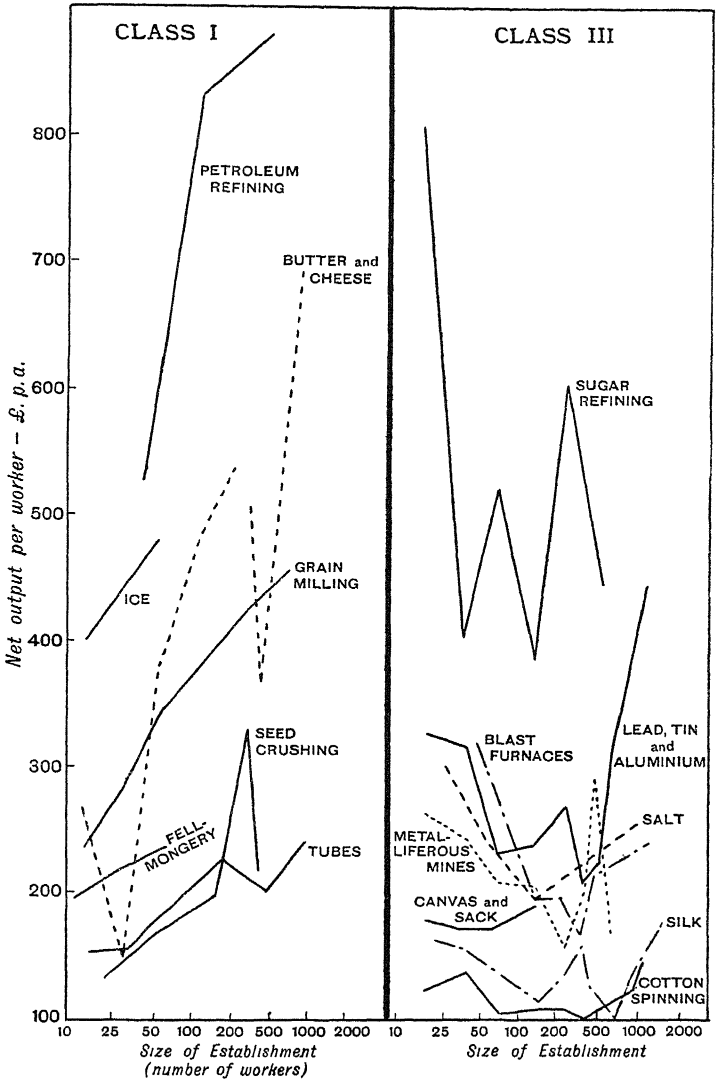
Class III.—U-shaped:
Lead, tin and aluminium; cotton spinning; salt mines; metalliferous mines; silk; canvas and sack; sugar; iron and steel blast furnaces.

Class IV.—Bell-shaped:
Wire; non-metalliferous mines; timber.

Class V.—Negative correlation:
Cotton-weaving; iron-smelting; jute; linen and hemp; textile finishing.

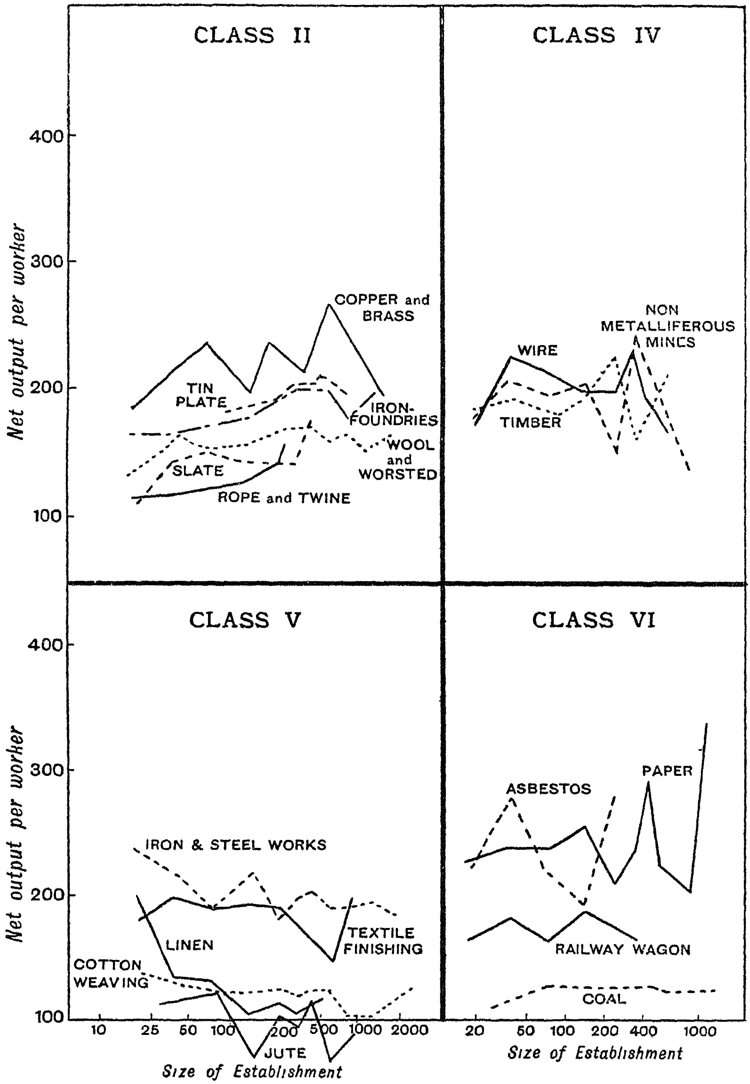
Class VI.—Others:
Coal; paper; asbestos; railway carriages.

The U-shaped curves of Class III indicate that either small or very large firms within the industries are more



efficient than the medium-sized firms. On the other hand, the curves in Class IV indicate that there is an

optimum size of firm within the included industries. The negative correlation within the industries of Class V



can perhaps be explained by the fact that each of those industries was very seriously depressed in 1930, and

small establishments in this case appear to be able to withstand depression better than large.

The fact that only three industries show graphs of Class IV is rather remarkable in view of the widely held theoretical opinion that there is an optimum size of firm in each type of industry; the absence of bell-shaped graphs proves that even within one industry there is no one optimum.

One consideration should not be neglected. If increasing returns prevail, but market imperfection is an important factor in certain industries, the high physical productivity of the larger firms will be masked by the relatively low price at which they have to sell their output in the assumed imperfect market. Coal may be a case in point. The Royal Commission on the Coal Industry in 1925 showed that the physical quantity of output per worker rose considerably with the size of firm, yet the Census of Production shows a virtually constant net money return per worker. It may be the case that the larger and more efficient pits, to dispose of all their output, have to sell at a greater distance in competition with other coal, and therefore accept a lower net return per ton after transport costs have been paid. In this case the "transport imperfection" of the market accounts for the observed results. But it will be noted that the output of all the industries in Class I is sold under conditions of comparatively perfect markets. On the other hand, a number of industries selling in perfect markets are to be found in the other classes. A surprising number of industries are found in the U-shaped category, indicative of two optima at a very low and very high level of output.

There is, however, no justification for concluding from these results that the increasing output of industries is no longer accompanied by increasing productivity per worker employed. Apart from the difficulty of selecting industries in several countries which are truly comparable as to commodities produced, there is the complicating factor of the different technical conditions of pro-

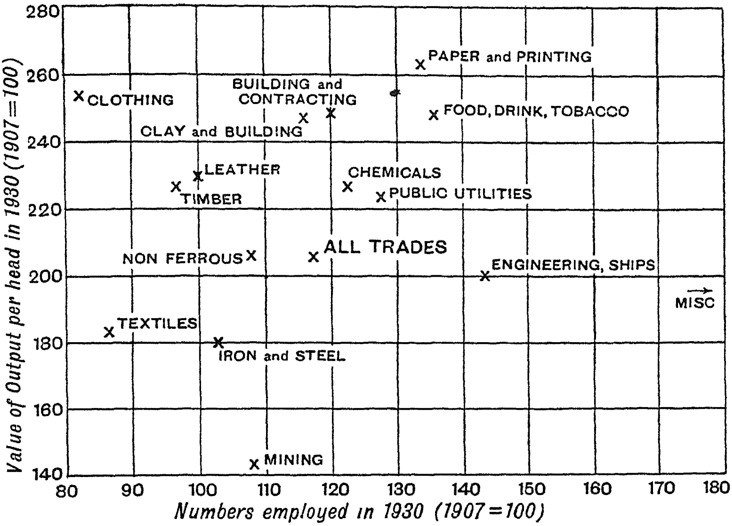
duction and the different marketing conditions with which industries are faced. Any spatial comparison of industries is subject to these limitations, and even a comparison of productivity in one industry at different dates may still be a comparison of different industries if marketing conditions have changed during the period.

Turning now to such measurements as can be made in physical units, the growth of industries and output per head between two dates may be examined. Production data for 1907 and 1930 given in the Census of Production of Great Britain are presented below in two diagrams. The first diagram shows money and the second real data for the industries reviewed. In both cases the 1930 figures expressed as percentages of those for 1907 are plotted.

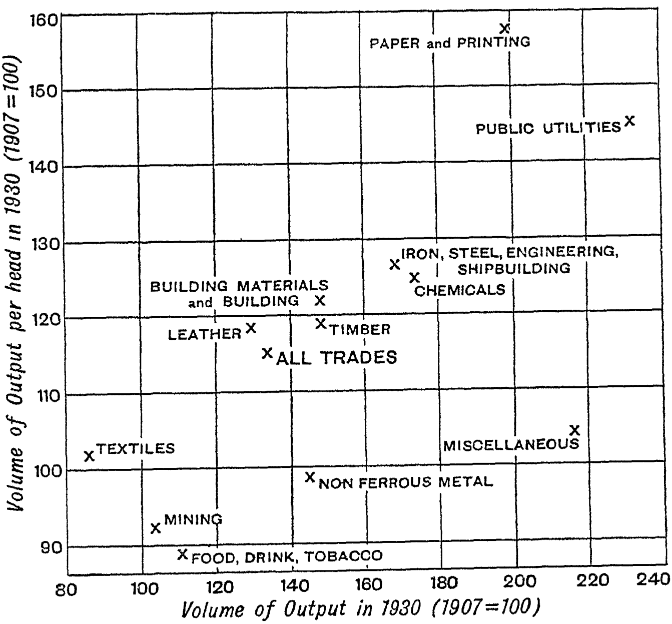
This is one of the few cases where both real and money figures are available. Examination of output in physical units shows a clear tendency to increasing return. Except for the miscellaneous group of industries where the data are both heterogeneous and inadequate, there is a clear correlation between increase in the volume of output and increase in the net return per worker. But translated into money terms, the sharpness of this distinction is entirely obscured and no correlation is visible. This evidence at any rate tends to show that the absence of correlation between size of industry and average return per head in the fields which we have so far examined (based perforce on monetary data alone) is not necessarily evidence of the absence of a tendency towards increasing returns. Physical increasing returns are there, the whole benefit of which is passed on to the consumer in the form of lower prices.

Volume of output in 1924–30 compared in reports of each industry for the 1930 Census of Production. Comparison of volume of production between 1907 and 1924 from paper by Douglas & Tolles, *Journal of Political Economy*, February 1930.

But undoubtedly the most penetrating analysis of the problem of Increasing Returns is provided by Mr.



PAPER and PRINTING
BUILDING and CONTRACTING
CLOTHING
FOOD, DRINK, TOBACCO
CLAY and BUILDING
LEATHER
CHEMICALS
TIMBER
PUBLIC UTILITIES
ALL TRADES
NON FERROUS
ENGINEERING, SHIPS
MISC
TEXTILES
IRON and STEEL
MINING
Value of Output per head in 1930 (1907=100)
Numbers employed in 1930 (1907=100)



PAPER and PRINTING
PUBLIC UTILITIES
IRON, STEEL, ENGINEERING, SHIPBUILDING
CHEMICALS
BUILDING MATERIALS and BUILDING
LEATHER
TIMBER
ALL TRADES
MISCELLANEOUS
TEXTILES
NON FERROUS METAL
MINING
FOOD, DRINK, TOBACCO
Volume of Output per head in 1930 (1907=100)
Volume of Output in 1930 (1907=100)

G. T. Jones's investigation.[1] He based his investigation on time comparisons over a long period in five industries, namely the building, cotton and iron industries in Great Britain, and the cotton and iron industries in the U.S.A. His measure of increasing return was somewhat wider than that used above, namely the quantity of all economic resources (and not merely labour) which had to be expended to obtain one unit of physical product. It will be noticed that in each of the industries concerned the output is, subject to some assumptions, reducible to physical units. To measure the progress of increasing returns, he made use of the ingenious device of "real cost". His starting-point is the price actually charged for the products of the industry in different years. In the case of the iron and cotton industries he takes the average prices of certain staple lines, and in the case of building the price of a composite piece of building work including a number of different operations. The "prices" (inclusive of profit and not merely costs) of various building operations are taken from a builder's price-book judged by authorities to represent a fair measurement of prices actually being paid for sub-contracts.

He then deflates this actual price by an index number indicative of changes in the prices of the factors of production (including profit). The precision of this method clearly depends on the weighting of this index number, but he was able to show by an experimental test that his results were in no case seriously affected by the adoption of possible alternative systems of weighting. The weights are based on the make-up of the price at a standard date, generally the year 1910. Raw materials were included as a factor of production, and changes in their price incorporated in the index number; thus account was taken of any economies or diseconomies in the use of materials as well as of labour, as the scale of production increased. That part of the price repre-

[1] Published under the title of *Increasing Return*. Cambridge University Press, 1933.

senting profit in the base year was given a weight in the index number, and deflated year by year in accordance with changes in interest rates; and unallocable costs entering into the price were deflated by the use of a general price index number. In this way he was able to obtain index figures of the real cost of producing a number of these articles over a considerable period of years.

SCALE OF PRODUCTION AND REAL COST PER UNIT

(Figures based on 1913 or adjacent year; Real Cost at seven- or ten-year moving average)

	English Building Industry	
	Output from Numbers at Work as shown by Census	Real Cost per Unit
1851	44·0	115·7
1861	52·1	109·3
1871	63·8	105·5
1881	77·7	108·2
1891	79·5	104·8
1901	107 3	99·7
1911	100 0	100·0

	Lancashire Cotton Industry	
	Output, Yarn and Cloth	Real Cost (Ten-year Moving Average)
1855	37·3	111·6
1875	58·5	100·0
1885	71·9	96·9
1895	81·2	96·8
1905	82·9	95·6
1910–13	100 0	100·0

	Massachusetts Cotton Industry	
	Output (Active Spindles)	Real Cost, Seven-year Moving Average (year's figures for 1914)
1854	14·4	181
1859	15·8	193
1865	18·1	206
1869	24·8	170
1874	36·5	148
1879	40·2	131
1884	48·6	120
1889	55·1	119
1899	73·7	101
1904	79·6	102
1909	88·7	101
1914	100·0	100

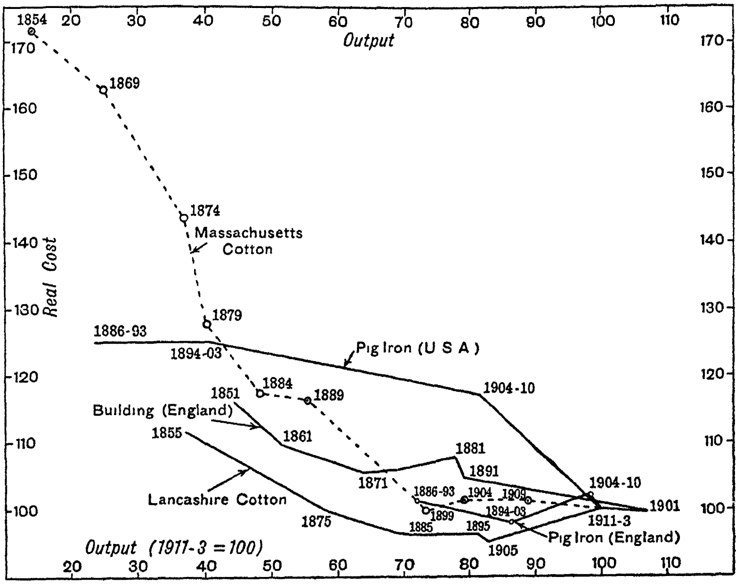
PIG-IRON IN NORTH-EASTERN DISTRICT OF GREAT BRITAIN AND IN U.S A.

Years	Great Britain			U.S A		
	Output of Pig-iron	Output per Furnace in Blast, thousand tons per day	Real Cost	Output of Pig-iron	Output per Furnace, thousand tons per day	Real Cost
1886–1893	72·1	28·1	101·2	26·7	25·4	125·1
1894–1903	86·5	34·6	98·4	41·1	51·0	125·0
1904–1910	98·6	42·8	102·0	81·2	86·0	117·4
1911–1913	100·0	45·4	100·0	100·0	112·4	100·0

The results of all these investigations are shown in the diagram. They are surprising enough in any case. In the building industry the reduction in real costs has been very moderate indeed. Over the space of sixty years a reduction of only 17 per cent was obtained, and the tremendous expansion of building which took place in the ten years between 1891 and 1901 gives a fall of 5 per cent only in real costs. Mr. Jones points out that this decline in real costs can almost entirely be attributed to the introduction of machinery into the joinery workshops. Some would regard this as an adventitious in-

vention, but he is satisfied that its main causal factor was in the expansion in the size of the industry and that this may be regarded as a true economy of increasing return.

In the case of the Lancashire cotton industry the results are much more striking. Such possibilities of cost reduction as there were seem to have been exhausted as early as 1885, and indeed since that date real costs



have tended to rise slightly in spite of increasing output. But the whole reduction during the best period in real costs was not more than 15 per cent. In the Massachusetts cotton industry, where the expansion in size was much greater, there was also a very marked fall in real costs, which fell from 170 units to 100.[1] But it is interesting to notice here that all possibilities in the way of reducing real cost seem to have come to an end by 1892. Between 1874 and 1898 the relative expansion of the

[1] In the diagram the figures plotted are slightly different from those given in the table. The figures in the diagram are the mean of the results obtained by two different systems of weighting. The abnormal period of the civil war is omitted from the diagram.

Massachusetts cotton industry was about as great as that of the Lancashire cotton industry between 1855 and 1885. Yet the reduction in real cost was much greater in the U.S.A. than in Lancashire. This shows that factors other than the mere rate of increase must be at work.

These suggestions are also of importance in the case of pig-iron. The British pig-iron industry between 1880 and 1913 "provided an almost constant return to human endeavour", as Jones puts it. The American industry, on the other hand, showed a very slow rate of reduction of real costs in the earlier years, rapidly accelerating in the closing period.

In the case of this industry, fluctuations due to the trade cycle are so great that the data have been averaged over periods which are set out to comprehend all the phases of one cycle. The rising output of the industry in Great Britain was associated with a sharper rise in average output per furnace, but even so, this led to no reduction in real cost. In the U.S.A., on the other hand, the average size of furnace expanded nearly fivefold, and these greatly enlarged furnaces under American conditions seem to have been worked at substantially lower real cost.

The pig-iron industry is undoubtedly of great interest, as is seen from the perhaps undue attention which it has received from economists. Being dependent on the transportation of raw materials which are at the same time bulky and limited in supply, it is, like primary producing industries, sometimes subject to definite diseconomies of large scale, and this appears to have been the case with the English industry during the period in question. Differing geographic and industrial conditions in America, on the other hand, left a net balance of increasing returns as the result of large-scale operation. It is interesting to notice that in the post-war years, when the output of pig-iron from this district in Great Britain was greatly diminished, the average real cost fell, though by less than 10 per cent.

Similar results, also demonstrating clearly the truth

of the principle of increasing returns when production data are examined in physical rather than monetary units, are obtained by studying the growth of certain American industries for which output data can be expressed in physical terms.[1] With the exception of two industries, namely cement and blast furnaces, these data show an exceedingly close correlation between *increase* in average size of establishment and increase in productivity per man-hour. In the case of the cement industry, there has been a great increase in productivity per man-hour with a slight decline in average size of establishment, while in blast-furnace production the increase in productivity is much greater than that expected from the general correlation.

	Percentage Increase in Average Number of Wage-earners per Plant, 1914–29	Average Productivity per Man-hour (1914=100)	
		1929	1931
Motor cars	248 *	346	306
Tyres	over 200 †	391	512
Petroleum refining	44	188	206
Leather tanning	40	142	154
Steel	39	168	160
Blast furnaces	30	248	276
Meat packing	25	132	144
Paper and pulp	23	158	181
Boot and shoe	8	130	136
Sugar refining	7	132	141
Cement	−8	181	203

* Excluding specialised body building plants in 1929.
† Data concerning average number of wage-earners per plant first available in 1921. Threefold increase in average size of plant shown between 1921 and 1929.

To summarise, therefore, the negative results obtained from all comparisons of monetary value of output per head in different countries and industries need only be taken as an indication that the benefits of increasing returns are almost universally passed on fully to the

[1] Figures from Beal, *Journal of the American Statistical Society*, 1934 Supplement, p. 67.

consumer. The data relating to industrial growth in Great Britain and the United States over the last thirty years, on the other hand, provide unassailable evidence that, at anyrate in a number of very important industries, increasing returns per labour-hour are associated with increasing size of industry and of plant. Mr. G. T. Jones's results show that this was also the case in the half-century or more prior to 1914; but they are also of the utmost importance in that they show us the number of significant exceptions to the generalisation.

This chapter may be concluded with a number of isolated historical data on the rate of change of industrial productivity. They are in general the results of less thorough investigations than Mr. G. T. Jones's, but cover a rather wider field.

In the case of the cotton industry, the well-known investigations of Dr. Schultze-Gävernitz give some data on costs extending back as far as 1784. His conclusions regarding the spinning section of the industry can be summarised in the following table:

	1820	1830	1845	1860	1881
Number of workers, thousands	111	140	190	248	240
Wage cost per lb. of yarn at 1860 hourly rates (average wage 12s. 6d. per week of 60 hours), pence	7·8	5·0	2·6	2·1	1·4

He also gives a table showing gross margin per lb. of cotton yarn:

Year	Gross Margin per Lb, pence	Hourly Wages, pence
1784	105 5	..
1797	49·5	..
1812	11·9	..
1822	7·6	1·7
1832	4·1	1·75
1892	2·85	3·6

Though for the earlier years these must be somewhat hypothetical, they provide a supplement and confirmation of Mr. Jones's figures. The great days of increasing return in this industry came to an end a century ago.

Such evidence as is available about changes in the productivity of the cotton trade since 1914, it may be added, appears to show that there has been some increase in the physical quantity of output per worker if changes in hours are taken into account. The prevalence of short-time working, however, makes the estimate very difficult.

Interesting early estimates of the amount of capital used in the cotton trade have been made by Dr. Chadwick [1] and by Professor Levi.[2] Dr. Chadwick's figures are given in detail and it is possible to revalue the 1924 capital of the industry at 1860 prices for purposes of comparison.

Capital at 1860 Prices	1860	1924
Spindles (at 18s. each), £ million	25·2	42 7
Looms at £24 each	7·2	12·5
Working capital	20·0	30 0
Total capital at 1860 prices	52·4	85·2
Number of workers, thousands	400·0	528·0
Yarn produced and consumed, million lb.	1730·0 *	2567·0

* Average 1859–61.

The capital of the industry thus increased by 62 per cent over this period. The labour force increased by 32 per cent, but allowing for shorter hours, was only about 2 per cent higher in 1924 than in 1860. Output measured in physical terms rose by 48 per cent, and allowing for the increasing proportion of the finer counts the true rise was probably greater. But most of this rise, according to Jones's figures, must have occurred in the twenty years immediately after 1860.

A detailed series of statistics of gross and net output

[1] *J.R.S.S.*, 1860, p. 8. [2] *J.R.S.S.*, 1863, p. 34.

of Scottish heavy industry in 1854 is also available for comparison with figures of the present day.[1] In 1854 Strang estimated the number of workers employed, the aggregate wages per year, the gross output by quantity and value, and the net output by value for the coal, iron ore, pig-iron and wrought-iron industries (steel at that date being used only on a small scale). He also gave considerable information about the earthenware and china, glass, glass bottle and clay pipe industries. Revaluing for each industry both output and the materials used at 1930 prices, we find that the coal industry at that date had an output of £192 per head as against £149 in 1930; the iron industry, £80 per head in 1855 as against £187 per head in 1930. The iron-ore mining and pig-iron industries taken in conjunction showed a net output per head of £168 in 1855 as against £200 at the present time. Gross output per head in the glass industry at 1930 prices was £220 in 1855 as against £350 in 1930. The definite retrogression in productivity of the coal mining industry is less remarkable than it appears, when we consider how strongly such an industry must be subject to decreasing returns; while the pig-iron and iron-ore industries taken together only show a very moderate advance; the same applies to the glass industry. In the production of wrought iron, technical improvements have led to a much more marked increase in average productivity per head.

Figures regarding productivity in two industries are available for France from a publication by Levasseur: [2]

GLASS-POLISHING

	Hours per Sq. Metre
By hand up to about 1800 .	112·0
By machine at present time .	3·4

[1] Strang, *J.R.S.S.*, 1855, p. 332; 1857, p. 134.
[2] *Comparaison du Travail à la main et à la machine.* Paris, 1900.

SHIRT-MAKING
(Per 100 doz.)

1848 (entirely hand-made)	1210 days of labour	
1900 (good-quality shirt finished by hand). "S'addressant à la petite bourgeoisie ou au dimanche de l'ouvrier."	Machinists Hand-finishers Home-workers: buttonholers others	80 days at 2·5 fr. 50 „ „ 1·5 „ 130 „ „ 1·0 „ 426·5 „ „ 0·75 „
		686·5 days = 725 fr.
1900 (hand buttonholing only).	Machinists Hand-workers Home-work: buttonholers	132 days at 2·5 fr. 50 „ „ 1·5 „ 130 „ „ 1·0 „
		312 days = 535 fr.
1900 (machine made).	Machinists Hand-workers	152 days at 2·5 fr. 50 „ „ 1·5 „
		202 days = 455 fr.

Showing a sixfold improvement in productivity in shirt-making and over thirtyfold in glass-making.

Increases in productivity of the order described, though very remarkable, are necessary if we are to explain the general rate of French industrial progress calculated above.

Levasseur also quotes the results of an extensive investigation made in the U.S.A. by Carroll D. Wright.[1] For a very large number of articles he quotes the number of workers and the number of hours which have to be worked per unit of output by hand and machine methods. Care is taken to include all maintenance staff

[1] *Hand and Machine Labour*, published under Act of Congress, 1894.

and foremen under machine production. Comparison of aggregate hours worked per unit of production by different methods is straightforward, but account must be taken of the relative quantities of different kinds of labour which have to be employed in the two methods. Account is taken of this factor by computing average wage cost per unit of output. Wright's figures are made non-comparable owing to the fact that the wage data were collected in different years, and in the table below allowance has been made for this by the use of a general index number of wages.

	Percentage of Cost of Machine to Hand Process		Minimum Scale of Operation (Number of Workers)	
	Hours	Wages	Machine	Hand
Ploughs	3·2	14·5	52	2
Butter	10·0	15·7	7	3
Cheese	7·2	10·9	3	1
Jam	35·8	60·6	73	95
Axles	9·3	8·1	33	2
Buggy	19·5	13·0	116	6
Wagon	20·0	11·1	75	5
Watches	3·4	2·2	(?)	14
Men's suits	41·5	32·6	71	6
Cotton goods	1·1	5·0	252	3
Men's shirts	13·0	19·0	230	1
Men's boots	10·7	5·2	113	2
Women's boots	8·7	10·4	140	1
Nails	0·8	..	83	3
Bread	31·9	27·7	12	1
Carpet	12·6	19·2	81	18
Wooden beds	7·2	4·3	52	5
Bureaux	24·4	18·3	36	1
Cane chairs	36·0	16·8	23	4
Gloves	40·6	110·0	16	6
Pipes	33·5	7·7	11	4
Marble table	0·2	0·3	3	2
Needles	2·1	1·6	57	4
Doors	9·2	6·9	9	1
Cigarettes	11·8	10·1	18	27

The results of this investigation certainly are surprising. From the production of marble tables, in which the productivity of the machine method is three to five hundred times as great as that of hand production, through a considerable range of articles in which more than a tenfold gain in productivity from mechanisation is recorded, we finally reach a number of important categories, such as furniture and clothing, in which the relative advantages of mechanisation are considerably less.[1] In many cases mechanisation involves the use of a more expensive type of labour, as is seen by comparing the first two columns; but instances are almost as numerous in which the opposite is the case. In nearly every case, too, the average size of establishment has to be increased, in many instances very markedly, though here again there are some important exceptions, such as the manufacture of jam and cigarettes.

These results may be criticised on the grounds that over no period for which we have records did the general productivity of American industry increase by anything like such a ratio as is here indicated. In reply it may be said, however, that even in the earliest years American industry was never fully carried out by hand operation of the type illustrated in the above calculations. But when we compare the productivity of modern American industry with that of less economically developed countries half a century ago, a ten- or twentyfold rate of increase in productivity is by no means out of the ordinary. Indeed within a single country (namely France), a sevenfold increase is found over the period 1840 to 1930.

[1] A survey of the number of man-hours needed for the production of 2000 pairs of men's shoes, assuming perfect balance of work in the factory (*Monthly Labor Review*, February 1939) shows, for the period since 1850 :

1850	31,020	1923	2,124
1900	3,402	1936	1,870

In the production of women's shoes on the other hand there has been no increase in output per labour-hour in the last ten years, though they shared in the great improvements before 1900.

CHAPTER IX

THE PRODUCTIVITY OF TERTIARY INDUSTRY

THE tables in Chapter X analyse the relative real purchasing power of average incomes obtained by primary, secondary and tertiary producers respectively in the principal countries. These results are only indicative of relative productivity as has already been explained, on the assumption that the same terms of exchange between primary, secondary and tertiary products prevail in different countries. This is not, of course, the case. In many countries the terms of exchange have been artificially moved in favour of certain groups of producers.

Subject to these qualifications we have the following figures of average real income per head of those engaged in tertiary industry in different countries :

	I. U.		I. U.
U.S.A. 1935	2456	Sweden, 1930	886
New Zealand, 1935–36	1296	Norway, 1934	650
Australia, 1935–36	1148	Italy, 1928	541
Great Britain, 1930	1072	France, 1930	440
Germany, 1928	935	Japan, 1934	374

In general, we find that the amount of real income, measured in our international units, which tertiary industry is capable of producing, is high. In countries which have a markedly low productivity in primary and secondary industry, tertiary industries have a productivity much above the national average, and this indeed accounts for the rapid transfer of population into tertiary employments. At the same time very wide variations may be noted in the figure of tertiary productivity, the American figure of 2456 units having a tremendous lead over the next on the list, namely New Zealand with 1296 units. Neither of these figures are

subject to the qualifications mentioned above, as in neither country do primary or secondary prices differ markedly from world level. Figures for Australia, Great Britain, Canada and Switzerland seem to be not far below this New Zealand level, followed by figures for Germany, Sweden, Norway, Italy and France.

The important and unexpected conclusion which we have so far reached is that varying levels of tertiary productivity are among the most important factors that determine the average level of real income in countries as a whole. In the U.S.A., indeed, average real income per head would be in the neighbourhood of 2400 international units per year instead of the present 1400, were not the average brought down by the low figure for production per head in primary industries. In New Zealand, where tertiary industries employ so remarkably large a proportion of the population, productivity in these industries is undoubtedly a principal factor in determining the high average level of real income per head of the country as a whole, even though in this case primary production per head is also at a very high level.

Before we treat this conclusion as established, however, we must assemble what information we can, scanty though it is, indicative of the real productivity of tertiary industries, per worker engaged, in the principal countries. The largest tertiary industry, whether in advanced or primitive communities, is always retail distribution. Here we shall find large and unexpected variations in real productivity per person engaged as between countries, and will also find evidence, in some cases, of rapid improvement in the efficiency of this industry. Transport is probably the next most important of the tertiary industries. In the U.S.A. in 1935, where tertiary industry produced 31·5 milliard dollars out of a total currently produced income of 53·0 milliard dollars, retail trade produced 4·3 milliards, wholesale trade 2·2 milliards and transport 4·3 milliards. In this latter case, of course, capital is of much greater importance than in any other sphere of activity except

manufacturing, although in 1934, out of 4·00 milliards of income produced by transport in the U.S.A. only 0·98 milliard represented dividends, profit and interest. Even in 1929 dividends, profit and interest represented only 2·16 milliards out of a total of 7·22 milliards produced.

The remainder of tertiary production consists largely of services such as public administration, domestic service, and sport and entertainment. There is a presumption, though it should be by no means necessarily assumed to be true, that improvements in efficiency are not possible in spheres of work of this sort. Be that as it may, it is exceedingly difficult at present to obtain any objective measurement. However, the fields of commerce, transport, communication and finance, in which improvements in efficiency are undoubtedly both possible and measurable, occupy a substantial proportion of the whole of those engaged in tertiary activities, namely 48 per cent in the U.S.A., 63 per cent in Canada, 50 per cent in Great Britain, 51 per cent in Germany — and similar percentages in nearly all countries.

Comparison may first be made in the field of railway transport.

Careful investigation of railway statistics throughout the world is made in the international section of the *German Statistical Year Book*. Two bases of comparison of railway charges are possible. The first is a simple comparison of the average charge made per thousand ton kilometres of goods transported without reference to their quality. This will distort the comparison as between countries such as Germany, where a large proportion of the traffic is coal and heavy minerals, and say Denmark, where a large proportion of the traffic may consist of lighter and bulkier goods. To take this into account use may be made of a further series of tables also calculated in the *German Statistical Year Book*, showing the charges made for fifteen-ton loads of various commodities in a number of European countries when carried over specified distances. Calculations based on

these figures give results in the same directions but not ratios of the same magnitude as those obtained by simple comparisons of cost per thousand ton kilometres.

To reduce these costs to terms of "real cost", a figure is worked out for each country representing combined hourly wages in terms of the country's currency, of a railway goods porter, a railway track labourer and

	Charge per Thousand Ton-kilometres	Reduced to Real Units by means of Wage Rates (Germany = 100)		Interest and Profits as per cent of Gross Revenue
		Charge per Thousand Ton-kilometres	Unweighted Average of Rates on Specified Commodities for 150 Kilometres	
Germany, 1935	Rm.36·6	100	100	4·2
U.S.A., 1935	$6·75	24	..	24·8
Great Britain, 1935	£3·22	120	..	19·2
France, 1934	230 fr.	109	138	0·7
Italy, 1933–34	200 lire	158	182	− 6·1
Holland, 1935	..	..	75	6·8
Belgium, 1935	296 fr.	115	80	3·6
Australia, 1934–35	£3·88	81	..	29·1
New Zealand, 1934–35	£6·05	127	..	16·2
Denmark, 1934–35	68·5 kr.	74	50	− 2 8
Sweden, 1934	48·3 kr.	64	50	25·0
Switzerland, 1935	..	..	119	23·7
Poland, 1934	..	..	115	13 7
Austria, 1935	..	..	161	− 4·8
Hungary, 1934–35	..	..	264	− 32·5

an engineering fitter. Expressed in terms of these wage units we can obtain figures indicative of the real cost of railway goods transport. The same wage data are used to correct the figures relating to freight rates on the specified commodities (coal and coke, iron ore, pig-iron, cast iron, machinery, timber, grain and flour, sugar and potatoes).

Finally, some account must be taken of whether freight rates charged involve the railway administration in a loss, or earn a profit. For this purpose the ratio of

profit and interest to gross revenue is calculated for each country. This is a rough-and-ready procedure, especially in the case of countries like Great Britain and Denmark where half or more of the railway revenue may be derived from passenger traffic, but should serve as some indication of the extent to which the charge for goods traffic covers the cost of capital.

Results of this investigation are very remarkable. The cost of transporting goods in U.S.A., measured in terms of the wages of labour employed by railways, is less than a quarter of the corresponding charge in Germany. Moreover, the American figure includes a substantial allowance for the payment of interest on capital, while the German figure is almost entirely absorbed in payments of the labour directly or indirectly used in transportation. The German figure, on the other hand, is very much below the real cost of transport in Italy, Austria or Hungary. Of the European countries investigated the lowest charges are in Denmark and Sweden. The Danish railways are run at a loss, but on the Swedish railways 25 per cent of the gross receipts are available for interest or surplus, and indeed after paying full interest on capital the Swedish railways yield a profit to the State. Canadian figures work out very similar to those of the U.S.A. Other European countries with low transport costs appear to be Belgium and Holland, though calculated on a ton-mileage basis Belgian costs are higher than German. Costs in France appear to be definitely higher than in Germany, while the French railways only earn a negligible surplus. Costs in Australia appear to be low, in New Zealand considerably higher. Very high levels of cost are shown by Austria, Italy and Hungary, which figures appear more remarkable in view of the fact that each of these systems is running at a considerable loss. The popular belief that Swiss railway charges are the highest in Europe is true in the literal sense of money charges ; but account must be taken of the fact that Swiss wages are very high, and that interest is paid in full, absorbing

24 per cent of the railways' gross receipts. Real costs under these circumstances are not high, in spite of the difficult nature of the country.

Low running costs in terms of the wages payable in the country are by no means always associated, as some railway experts believe, with high traffic density. Taking one million ton-kilometres per year per kilometre of line as our measure of density, traffic density is much the same in Germany, Great Britain and the U.S.A. at 1·17, 0·83 and 1·07 respectively. In Denmark the density is only 0·22 unit and in Sweden 0·21 unit, while in Australia and New Zealand it falls as low as 0·13 unit. In the intermediate ranges of density we find Canada 0·50 unit, Austria 0·49 unit, Italy 0·47 unit. The highest density of traffic in the world—indeed no other figure comes within measurable distance of it—is in Soviet Russia, where it amounts to 2·46 units. Comparative data of costs in Russia are unfortunately unobtainable. It appears that such low costs as those prevailing in Canada and the U.S.A. can best be obtained under conditions of fairly high traffic density, although remarkably low figures of real cost were found to obtain in Sweden and Denmark, where traffic density is low.

Whether, in fact, in the long run transport yields "increasing returns" to labour remains an unsolved problem. What is clear is that the inefficient, or only moderately efficient, systems of transport which prevail in certain countries have a depressing effect upon real national income. Although only a small fraction of the national labour force in any case is devoted to transport, the discrepancies of real cost are so remarkable that transport may exert quite an influence in determining comparative levels of real income in different countries.

In the case of retail distribution, now in every country one of the most important industries, surprisingly little information is available. A number of data regarding retail distribution in Great Britain together with some international comparisons, have been collected in a

memorandum by the present writer.[1] The data do little more than illumine the vast darkness beyond, but at any rate they suggest certain important and unexpected conclusions and serve to draw attention very strongly to the need for economic investigation into the problems of retail distribution.

The subjects on which information may be sought are:

(1) Comparisons between the level of real costs per unit of distributive work done in different countries.
(2) Changes in these real costs in time.
(3) Evidence about the relative efficiency of distributive units of different size, and the optimum size of shop.

In the first field the information available is least. Censuses of distribution have been held in the U.S.A., Canada and Eire; some fairly thorough official investigations have been made in Italy; and a certain amount of information is available about Great Britain. In practically every other country statistics of retail distribution are in complete darkness. In the memorandum referred to above, an estimate is made of the real volume of sales per week per head of the working population engaged in retail distribution, including both proprietors and wage-earners, quantity of goods sold being expressed in international units. The order of magnitude of the figures is as follows:

Canada, 1930–31	150	Italy, 1934	55
U.S.A., 1935	135	Eire, 1933	55
Great Britain, 1936–37	120		

In *La Distribuzione delle Merci in Italia* a comparison is made of the numbers of population per retail worker (wage-earners and proprietors) in different countries. These figures must not be taken as indicative of the real efficiency of the retail trade, because of the very varying

[1] Transmitted to the Fabian Society for incorporation in a forthcoming book on retail distribution.

standards of living in the different countries. Multiplying these figures by average real income per head in the different countries measured in international units, we obtain some measure of the order of magnitude of the volume of goods distributed per worker in retail distribution. These figures confirm those obtained directly.

	Population per Retail Worker	Population per Retail Worker multiplied by Real Income per Head of the Occupied Population (Arbitrary Units)
Switzerland	12	12·4
France	17	11·8
Germany	15	9·7
Italy	26	8·8
Great Britain	18	19·2
U.S.A.	14	19·6

The International Institute of Agriculture has prepared, at the request of the League of Nations, a report, *Investigations into the Margin between Producers' and Consumers' Prices of Certain Foodstuffs.* Though primarily of agricultural interest, the data in this report throw a flood of light on the relative efficiency of the transporting and distributive industries of various countries, so far as the food trades are concerned.

The data in this report can be rearranged to show, for given quantities of certain foodstuffs, the difference between producer's and retail price, in the currency of the country. To bring these into international and intertemporal comparison, the most reasonable unit is obtained by dividing the money figures by average hourly wages. Any general average of wage rates would do, but to obtain the most relevant, hourly rates for bakers, lorry-drivers and railway labourers are averaged together for 1936 (for other years the figure is adjusted by means of the general wage index in each country).

The hourly wage rates used as divisors were as follows :

Austria, 1926	1·30 schillings
,, 1936	1·21 ,,
Canada, 1936	0·45 dollar
,, 1934	0·40 ,,
Denmark, 1939	1·39 krone
,, 1936	1·47 ,,
Finland, 1931	7·8 finmarks
,, 1936	9·0 ,,
France, 1932	4·3 francs
Germany, 1913	0·45 mark
,, 1925	0·70 reichsmark
,, 1930	0·93 ,,
,, 1937	0·72 ,,
Holland, 1923	0·57 florin
,, 1930	0·57 ,,
Poland, 1928	1·31 zlotys
,, 1935	0·94 zloty
Switzerland, 1927	1·7 francs
U.S.A., 1913	0·28 dollar
,, 1929	0·65 ,,
,, 1932	0·55 ,,
,, 1935	0·66 ,,
Great Britain, 1936	14 pence

Divided by these factors, we can in effect express the costs of distribution in terms of hours of labour.

International variations in the efficiency of this group of tertiary industries are just as striking as in primary and secondary industry. Clearer still is the hope which these figures hold out to countries whose standards of living are at present kept down by low productivity, that in these tertiary industries productivity may be improved to the levels found in the more advanced countries. For productivity in these industries, unlike primary or secondary production or railway transport, is not determined either by natural resources or by the scale of operation.

The real cost of production and distribution of *bread* is lowest in France and Britain and highest in Finland. In the U.S.A. it has been reduced considerably since 1913, though little progress was made between 1929 and 1935. In Germany this, like every other department of

economic life, was disorganised by the inflation, and since 1925 steady progress has been made.

In the case of *meat*, costs show a rising tendency in the U.S.A., though the American figures are much lower than those of the two other countries quoted. In the case of both eggs and potatoes substantial reductions in

COSTS OF DISTRIBUTION IN VARIOUS COUNTRIES MEASURED IN HOURS OF LABOUR

	100 Kilos Bread (Margin over Cost of Cereals)	100 Kilos Pork (Margin over Cost of Live Pig)	100 Kilos Beef (Margin over Cost of Live Steer)	100 Kilos Fish	100 Litres Fresh Milk ¶	100 Kilos Butter	100 Kilos Cheese	100 Eggs	100 Kilos Potatoes
Austria, 1926	20 6	195 *	142 *	57 *	11 9	102 *	67 *	1 57 *	9 1
,, 1936	27 1	144	135	54	13 7	33	45	1·70	5 0
Canada, 1926	24 8		.	.	.	.	.	..	..
,, 1933	25 8	.	..	83 †	.	..	..	.	..
Denmark, 1929	..	..	..	50 ‡	13 9	31	9	..	..
,, 1936	.	.	..	36	13 9	25	24	..	..
Finland, 1931	48	54	51	..	..		.	.	3 9
,, 1936	44	31	34	..		..	..	..	4 3
France, 1932	17	..	..	..	18 0 §	..	..		.
Germany, 1913	26 3	.	.	.	.	..		.	..
,, 1925	28 1	..	.	..	.	..		.	..
,, 1930	24 5	..	..	..	.		..	..	..
,, 1937	23 9	..	.	.	.	85 ‡	.	.	6 5 ‡
Holland, 1923	.	..	.	.	.	62	..	.	.
,, 1930	.	.	.	.	11 5	60	..	.	.
Poland, 1928	..	.	..		33 6	.	.	.	
,, 1935	..	..	..	..	26 5	..	.	.	.
Switzerland		..	..	.	7 3 ‖	..	.	.	.
U.S A , 1913	34 0	27 5	56 2	..	9 3	.		3 86	5 5
,, 1929	24·9	32 4	61 5	..	6 9	.	.	2 16	5 4
,, 1932	24 7	36 7	61 0	.	7 0			1 70	4 0
,, 1935	23 0	37 5	54 6	..	5·8	.	.	1 58	3 65
Great Britain, 1936	19 5	..	..	..	16 7	37 5	43 2	4 79	3 55

* 1929 † 1934. ‡ 1935. § 1931.

‖ Of which 3 8 represents wholesaling and pasteurising, the rest retailing.

¶ Supplementary data for milk in 1935, calculated in memorandum mentioned above, in hours of labour per 100 litres :

Italy	23 4	Belgium	12 7
Australia	14 3	Sweden	7 3

distributive costs have been made in U.S.A. since 1913, though the present figures do not seem to be greatly below those shown for European countries.

The differences in cost of milk distribution are of great interest in view of the importance of milk as a food, particularly for children.

It has been estimated in Great Britain that the present costs could be almost halved by a more efficient

distributive system, and by reference to the figures for Sweden, Switzerland or Canada, this would seem to be substantiated (though in each of these three countries average consumption of milk per head is much greater than in Great Britain). In the city of Sydney, an estimate has also been made that the average retailer's margin of 11d. per gallon could be reduced by 3d. or 4d. by the adoption of the block system, whereby each delivery vehicle was given a block whose requirements amounted to ninety gallons per day and there was no overlapping. In Sydney the entire margin between farmer and consumer amounts to 16¾d. per gallon, of which 4d. represents the gross margin of the wholesaler, and it appears that this also was capable of considerable reduction by the adoption of more efficient methods.

The important point of general interest is the magnitude of these discrepancies between countries, and the very large relative reductions which it is estimated could be obtained by more efficient methods of retail distribution. From the data which we have already given, economies of this nature now represent an important factor in determining the real income of the whole country, and will represent a still more important factor in the future.

An interesting indication of real cost in distribution of coal has been made by Mr. J. W. F. Rowe.[1] Retail consumption of coal in the U.S.A. amounts to 125 million tons, which is distributed by 40,000 retailers, whereas to distribute 34 million tons of coal for domestic consumption in Great Britain requires 27,000 retailers.

Outside the sphere of necessaries, some comparison can also be made between the retailing costs of furniture in Germany and Great Britain. No figures indicating the comparative level of factory prices of furniture in the two countries are available, but it may probably be assumed that if anything the German prices are lower. The average mark-up in Germany in 1933 was 40 per

[1] *Economica*, 1926, p. 207.

cent of the wholesale price. In Great Britain 50 per cent is generally regarded as the minimum, and figures of 100 per cent mark-up are not unknown. In the U.S.A., where possibly factory prices are somewhat lower, 100 per cent is generally regarded as the minimum mark-up. What is remarkable about the German figures [1] is that they relate to the year 1933, in which year sales were exceedingly low. In 1936 retail sales of furniture were nearly double those of 1933, in 1929 were more than double. The analysis of sales costs in Germany was as follows:

Wages and salaries	34 per cent
Imputed earnings of owner and family	13 ,,
Rent	16 ,,
Other costs of maintaining building	5 ,,
Advertising	5 ,,
Sales tax	10 ,,
Interest and aggregate costs	8 ,,
Insurance and miscellaneous	9 ,,

It was pointed out, however, that 65 per cent of all sales were cash sales, unlike the figures for Great Britain and the U.S.A. This appears to be the most important reason for low costs.

When we come to measure any changes in the real productivity per head of distributive workers, more progress can be made. For the U.S.A. figures have been calculated by Professors Warren and Persons,[2] and also by the Bureau of Agricultural Economics, for the average money cost of the wholesale and retail distribution of foodstuffs. These figures are obtained by comparison of the wholesale and retail prices of a similarly constructed list. This is divided by an index of average hourly earnings of industrial workers to obtain a measure of the real efficiency of labour engaged in the distributive trades. The two series agree closely. The figures quoted below are those of the Bureau of Agricultural Economics.

[1] Bulletin of the Institute of Konjunktur, 23rd January 1935.

[2] In their book *Prices* (reprinted and brought up to date in *Farm Economics*, a periodical published by Cornell University).

Year	Money Cost of Distribution * of Foodstuffs consumed by Typical Working Man's Family, $	Real Cost, after dividing by Hourly Wage Rate (1926=100)
1913	118	269
1919	203	254
1920	242	237
1921	225	237
1922	204	224
1923	211	222
1924	211	218
1925	212	214
1926	216	216
1927	216	213
1928	213	209
1929	220	212
1930	220	212
1931	201	203
1932	182	208
1933	172	199
1934	187	183
1935	195	183
1936	190	175
1937	193	158
1938	191	152

* Processing taxes excluded.

These figures show a very marked reduction in the real cost of distributing these foodstuffs, with a check to the fall between 1924 and 1932. Between 1929 and 1932 the comparative stationariness of distributive costs, accompanied by rapidly falling farm prices, leads to the startling conclusions obtained by Ezekiel [1] and shown in the following table.

This table draws attention to two points of very great importance. The first is the much greater proportionate reduction in price suffered by the primary producer than by the distributor. The second is the comparatively small proportionate reduction in the retail price brought about by a very great reduction in the wholesale price, owing to the high absolute level of distributive costs.

[1] *Journal of the American Statistical Society*, 1933, p. 184.

FARM AND RETAIL PRICES

	Farm Price	Retail Price
Beef, cents per lb. live weight:		
1929	14·4	19·4
1932	8·0	12·4
Hogs, cents per lb. live weight:		
1929	10·0	15·3
1932	3·2	10·0
Bread, cents per lb.:		
1928	1·9	9·1
1932	0·6	6·7
Cigarettes, cents per lb.:		
1928	18	58
1931 (exc. tax)	8	76

This point is of inescapable importance in problems of the adjustment of supply and demand. Unless the elasticity of consumer's demand is very high, which is not the case, a reduction in producer's price to an indefinitely low level may still have very little effect in stimulating consumption. Hence the case which primary producers are able to put up all over the world in favour of restriction of supply.

For Canada a comprehensive calculation can be made for the two years 1900 and 1913. In the *Report on Prices* of 1915 the wholesale and retail prices of a weekly family budget are given for those two years. The aggregate figures are as follows:

	Prices in Cents	
	1900	1913
Wholesale	405·5	558·7
Retail	593·0	808·4
Margin	187·5	249·7

The gross margin on a specified quantity of goods had thus risen by 33 per cent, while the rise in general wage rates quoted in the same report was 42·9 per cent

over that period. There thus appears to have been a moderate reduction in the real costs of distribution.

In the case of Germany an interesting but limited comparison can be made in the case of six important commodities, going back to the year 1880. The data for the earlier period are obtained from Van den Borght, *Der Einfluss des Zwischenhandels auf die Preise* (Leipzig, 1888), and refer to wholesale and retail prices at Aachen over the period 1878 to 1886. For a certain number of commodities the gross margins can be compared with those prevailing in the same town in 1935, as given in *Statistisches Jahrbuch*.

GROSS MARGINS IN PFENNIGS PER KILO

	1878–86	1935
Flour	5·3	11·5
Potato	2·7	4·7
Turnip	6·2	27·3
Rice	9·1	21·8
Sugar	12·4	34·1
Butter	46·4	61·0

In this case the increase in distributive margins appears to have been of the same order of magnitude as the increase in wages.

For Great Britain a number of figures are available. The real volume of goods sold at retail can first be calculated for 1907, when the first Census of industrial production was held, and can be obtained with a certain amount of precision for more recent years. The figures of retail sales taken as a whole are not of course so precise as those relating to principal commodities, and only provide a rather vague indication of trends. So far as they can they show that between 1907 and 1932 the real volume of goods sold increased 21 per cent while the numbers engaged in distributive trades increased 19 per cent — only a small increase in volume of goods sold per head, though it must be remembered there was quite

a substantial reduction of working hours during this period.

Between 1932 and 1937, during which period the fall in hours was slight if any, the real volume of sales increased by 26 per cent, and the numbers engaged in retail distribution by 10 per cent only. There seems to be some indication that the pace of progress has accelerated in recent years.

These figures, however, are not applicable to all classes of goods. A special return prepared by the Co-operative Union in 1930 showed that the unweighted average of the changes in the gross margins between 1913 and 1929 on nine principal types of goods sold showed an increase of 9 per cent only, in spite of the fact that the average wage paid by co-operative societies was increased over that period from £60 to £126 and there had been a substantial reduction of hours. More striking, because covering a wider range of goods, is a comparison of the gross margins on the following list of commodities for 1900–1902 with the figures for 1933 :[1]

AVERAGE GROSS MARGINS IN PENCE

	1900–1902	1933
Bacon, lb.	1·3	2·88
Flour, 7 lb.	2·88	4 75
Sugar, 1 lb.	0·42	0·03
Butter, 1 lb.	2·2	1·95
Cheese, 1 lb.	2·25	3·88
Margarine, 1 lb.	0·8	2·8
Eggs, each	0·48	0 40
Potatoes, 7 lb.	2·25	2 42

The narrowness of the gross margin on sugar is due to the practice of English grocers of using this article as a " loss leader " ; but this fact must not be neglected in compiling a general average of the costs of distribution. Weighting the above commodities in accordance with

[1] Figures for 1900 to 1902 taken from *Board of Trade Report on Wholesale and Retail Prices*, 1903. Figures for 1933 from Ministry of Labour for retail prices and *Board of Trade Journal* for wholesale prices.

the average consumption per head per week in Great Britain at the present time, aggregate gross margin in the earlier period was 30·5d., and only 34·7d. in 1933. The rise in retail wages over the period 1903 to 1913 can be put at about 15 per cent and over the whole period at some 125 per cent, while the rise in hourly wages was even more marked. There is no doubt that there has been a tremendous improvement in the real efficiency of distribution of groceries in Great Britain over the last thirty years, even though this may have been offset by a decline in efficiency in certain other trades. In the milk trade, for instance, the difference between retailer's buying price and selling price for a gallon of milk eighty years ago was sixpence a gallon.[1] At that date the farmer's price for milk was 6d. a gallon while the retailer's buying price was 8d. and selling price 1s. 2d. The difference between retailer's buying and selling price is now 10d. per gallon, while average weekly wages have risen rather more than threefold, and average hourly wages probably about fourfold. Unsatisfactory though the present situation is in the milk trade, it is far less unsatisfactory than it was at that date.

Certain information has been collected by the present writer regarding the average efficiency of shops of different sizes. In the grocery trade analysis of the reports of a number of stores controlled by an important English co-operative society revealed the following situation :

Average Turn-over, £ per week	Costs (including Interest but excluding Profit) as Percentage of Turn-over
100-200 . .	13·21
200-300 . .	11·51
300-400 .	11·13
400-500 . .	10·50
500 upwards .	10·08

[1] Dodd, *The Food of London* (published in 1856).

A steady fall in cost as the size of the business increases is revealed by these figures, and for the stores doing the most business the unprecedentedly low cost ratio of 10·1 per cent was established. One is almost tempted to say that the economies of large scale in retailing are more marked than they are in manufacturing. The steadiness of the fall in costs with increasing size of business is quite remarkable, though it must be noted that we are here dealing with the distribution of groceries which are comparatively standardised goods.

In the case of butchery it was possible to obtain interesting comparisons relating to costs per unit of turnover in shops of different size in England and Holland. The English figures related to butcheries owned by co-operative societies and included manager's salary and interest in the costs in each case. In the Dutch figures[1] a careful allowance was made for the services of the proprietor and his family on the basis of an estimate of what their wages would have been if they had gone out to work. The Dutch figures relate to 1932 and the English figures to 1936, converted at the 1936 rate of exchange. Though the relation is by no means precise, it was found that a Dutch guelder in 1932 purchased approximately the same quantity of meat as could have been obtained with the equivalent amount of English money spent in England in 1936.

Turnover, £ per week	Costs as Percentage of Turnover	
	England	Holland
48-58 . .	18·4	22 7
58-68 . .	18·9	21·2
68-77 . .	15·9	22·1
77-96 .	15·1	21·2
96-144 . .	15·0	17·9
Over 144 . .	13·4	14 0

[1] *Butchery Costs in Utrecht, Maastricht and Schiedam,* Report compiled by Economisch Instituut voor den Middenstand.

In the case of the U.S.A., extensive investigations with which, unfortunately, the author's familiarity is limited, have been made into retailing problems. A summary of a number of previous investigations was made in the 1931 Supplement of the *American Economic Review*. Among the most interesting figures quoted were the summaries of a number of co-operative investigations as to the differences in prices of groceries purchased in chain stores and independent stores. For a number of districts the difference varied between 12 and 15 per cent of the retail prices. Even allowing for the fact that chain stores probably pay much lower wholesale prices than do independent retailers, it still appears to be the case that the level of real efficiency in chain stores must be far greater than in independent shops. Another interesting fact which was brought to light was that the "mortality" rate among shops in a number of towns was in the neighbourhood of 25 per cent per annum; and, more surprising still, that this mortality rate had also prevailed forty years previously.

CHAPTER X

THE MORPHOLOGY OF ECONOMIC GROWTH

WITHOUT doing greater violence to common sense than is done by most far-reaching classifications, the whole of economic activity has been divided above into the three fields of activity, called for convenience, primary, secondary and tertiary.

The first broad category is defined to include agriculture, livestock farming of all kinds, hunting and trapping, fisheries and forestry, though in certain cases it would be desirable to separate the statistics of forestry and fishing. In most countries, the value of activities in these two fields is very small compared with agriculture and stock farming as a whole.

Secondary industry is defined to cover manufacturing production, building and public works construction, mining and electric power production. Mining and electric power production are in certain countries included with primary production, on the grounds that they represent the exploitation of natural resources. This is true; but in many respects the operation of these industries resembles that of manufacturing industry, and certainly bears little resemblance to agriculture. The building and constructional industry presents certain difficulty. There might be some case for including it with the service industries, especially that large part of its output which consists of repair and maintenance work conducted on a small scale. In some countries building is included in the industrial statistics, in others it is not. Manufacturing itself is not easy to define, especially in countries and epochs where the work of individual craftsmen is of substantial importance. In certain countries industrial statistics only cover factories and workshops using mechanical power or

employing at least five (or some specified number) of workers. In countries like the U.S.A. and Great Britain, where the proportion of individual craftsmen is small, the industrial statistics are more comprehensive.

"Services" includes commerce and distribution, transport, public administration, domestic, personal and professional services. It is sometimes urged that the value of the work done by public servants is not a net contribution to the national income, as without these services the remainder of the national income could not be produced, and they should therefore be regarded as a necessary cost incurred in the production of the remaining goods and services in general. In accordance with the convention hitherto used, however, all public services are regarded as a form of net production. Also in accordance with the convention hitherto adopted all paid domestic work is included and all unpaid domestic work excluded.

As built up from these items, we will obtain a total which falls a little short of the national income as hitherto defined. We have not included the rents derived from dwelling-houses, or income derived by any country from capital held abroad. Both these contributions to national income are obtained without any current expenditure of labour. Excluding them, we are left with "national income currently produced", which may be fully subdivided into the three divisions. Examination of the distribution of the labour force in any country between these three main divisions in comparison with the contributions made by them to national income will show that the average income may be very different in these three sections, measured per head of the labour force engaged in them, and may vary very widely from time to time and from country to country.

If we give our consent to this division of all economic activity into primary, secondary and tertiary, and to the definitions suggested above, we find some remarkably convenient simplifications of analysis follow from it. In the first place, the output of primary and secondary

industries is (with the exception of buildings and constructional work) always transportable, while the output of tertiary industries is not. There can be and almost certainly will be unless it is prevented, international trade in all primary and secondary products other than buildings except perhaps for certain exceedingly heavy, bulky, or perishable commodities. There can be no international trade in tertiary products, with the exception of certain forms of transport itself, or of financial services such as banking and insurance. In the latter case, the so-called "invisible exports" which bulk considerably in the balance of payments of such countries as Great Britain and the U.S.A., partake more of the nature of interest received on overseas loans of capital than of any real "export of services". That tertiary producers, a large and increasing proportion of the working population of every country, are being by the nature of their work automatically excluded from international or interregional trade, is a matter of extreme importance.

The next consideration of fundamental importance is that the output of primary producing industries consists largely of necessaries of life. This being the case, it is inevitable that the proportion of national income spent on them, and the proportion of national effort devoted to their production, should fall as general prosperity increases. More important from the immediate point of view is the fact that the demand for their produce is almost certain to be inelastic. This feature will also be shown by primary production of the type which does not directly produce the physical necessaries of life, such as the production of timber and wool. In this case, the value of the basic material generally forms such a small fraction of the finished article produced from it, that, in accordance with the well-known economic theorem, the demand for the basic product is almost certain to be inelastic in this case too. The only exceptions are likely to be in those limited and specialised branches of primary production supplying non-necessaries, or goods of the type which have hitherto not been available to a large

proportion of the world's population. It is possible that meat and other livestock products come to some extent in the latter category. In the former will be found little beyond rare fruits, flowers, and possibly tobacco.

Though it is possible that the aggregate volume of demand for certain livestock products may considerably increase in the future, it is still unlikely that this will be accompanied by any considerable elasticity of demand, in view of the very high proportion which distributive costs bear to the purchase price paid by the consumer in modern communities.[1]

The basic difference between primary and secondary types of production has always been, it is supposed, that the former is subject to conditions of diminishing return and the latter to conditions of increasing return. Discarding the huge mass of bad definitions which have grown up around these two simple phrases, we may say that a condition of decreasing return prevails when the average real cost (quantity of economic resources used) per unit of output increases *as a consequence* of an increase in the amount produced; an increasing return when there is a diminution in real cost per unit as a consequence of the increase in the amount produced. The fact that very often in the modern world increased output of primary produce has been accompanied by decreasing average costs per unit is not evidence, except in some special cases, that the law of diminishing returns has ceased to operate. In many cases these reductions in cost are the consequence of improvements in technique which might have caused a considerably greater reduction in average real cost per unit if output had been smaller.

The law of diminishing returns in primary production is often regarded as axiomatic. Nothing should be regarded as axiomatic in economics, but in this case we have found remarkable evidence from every angle to convince us of its truth. Regarding the existence of increasing returns in manufacturing production, the

[1] See, for example, p. 331 above.

evidence has been found to be generally satisfactory, though by no means without exceptions or qualifications.

The economics of tertiary industry remains to be written. Many as yet feel uncomfortable about even admitting their existence. In this case, such little evidence as is available shows that in certain circumstances remarkable examples of increasing return may be obtained.

From Sir William Petty's day to the present time the transfer of working population from primary production to secondary and tertiary has been continuing, and perhaps will continue for as many centuries more. This is clear evidence that world economic equilibrium has not yet been obtained, and indeed that the world is still within a very long distance of obtaining it. In other words, certain agricultural countries and regions must be regarded as being "overpopulated". This word is not used in the sense that they are in any way unable to support their present populations, but simply in the economic sense of the term, namely that their inhabitants could earn considerably higher average real incomes per head in other industries or territories, and, if actuated by economic motives, will in the course of time do so.

We should expect to find the widest differences between productivity per head of the population engaged in primary industries in different parts of the world, related inversely to the density of population per unit of natural resources. It is reasonable to expect that the discrepancy between productivity per head in secondary industry in different countries would be less. Both these expectations are found to be fulfilled. With regard to tertiary industry, we have no *a priori* expectations, and therefore the figures can give us neither fulfilment nor disappointment, but they certainly give us a number of surprises. The following table[1] shows average real income per head in international units in primary, secondary and tertiary industries in a number of countries. This table has been obtained by taking the

[1] Sources given below, pp. 345-370.

figures of average income per head in each of the three industries measured in the currency of each country and comparing them with the general average income per head.[1] It can only act as a measure of the relative productivity of these industries in different countries so far as the terms of exchange between their products are the same in each country.

PURCHASING POWER OF AVERAGE INCOMES PER HEAD I.U.

	Primary	Secondary	Tertiary excluding rents	Income Currently Produced	All Income
Great Britain, 1930	827	1151	1072	1095	1259
U.S.A., 1935	688	1728	2456	1859	1970
France, 1930	500	1373	440	658	714
Norway, 1934	268	1123	650	603	.
Japan, 1934	146	959	374	365	..
Italy, 1928	328	471	541	426	.
Sweden, 1930	278	1109	886	740	..
Australia, 1935–36	1408	1461	1148	1277	1377
Switzerland, 1929	816	1183		1123	1147
Germany, 1928	440	810	935	760	..
New Zealand, 1935–36	1872	1653	1296	1481	..

A certain discontinuity is introduced into the figures of secondary production by the inclusion of the production of craftsmen in the figures for Italy and Germany, and their exclusion from the figures of France, Norway and Japan. In these latter countries, specific data being lacking, they have had to be included in tertiary production. In Great Britain, U.S.A. and Sweden industrial production by craftsmen is not very considerable, and their inclusion or exclusion affects the figures very little. Allow, therefore, for some depression of the Italian and German figures below comparable level.

In the case of primary and secondary production we can compare the real incomes of producers expressed in I.U., shown above, with their real productivity. Our productivity data for primary production in 1934–35 are

[1] See page 276, note 1.

already available in I.U. To convert the productivity figures for secondary industry (given on p. 278) into I.U. we must first subtract 13 per cent, as prices of finished manufactures in the U.S.A., averaged over the whole period 1925–34, were 13 per cent below 1925 level, and we must deduct 15 per cent where necessary to convert from an "output per operative" to "output per person engaged" basis.

The productivity figures (primary for 1934–35, secondary for the same years as are used in the table above) in I.U. per year are :

	Primary	Secondary
Great Britain	475	975
U.S.A.	661	2380
France	415	680
Norway	..	1260
Japan	88	..
Sweden	352	.
Australia	1524	925
Switzerland	433	..
Germany	490	..
New Zealand	2444	1855

In Great Britain purchasing power is higher than productivity in both industries, indicating some degree of protection. The only protection enjoyed by British agriculture (in 1930) was a natural protection represented by the substantial margin which fresh meat, milk and fruit can command over imported. The French figures indicate a high degree of industrial protection, the Japanese of agricultural protection. In Australia high protection is enjoyed by the secondary producer, a consequence of which is slightly to reduce the standard of living of the primary producer below that which he would enjoy if he were free to buy at world prices. This tendency has to a large degree been offset by the protection afforded to certain primary products within the Australian market.

Developments over a longer period may now be considered. In this case we must mainly use "purchasing power" data of average real income per head in the different industries, though productivity data are sometimes available to compare with them. The differences between the results obtained by the two methods must always be borne in mind.

We may first enunciate the simple but important principle that economic progress in any country, in the sense of a rise of the average real national income per head of the working population, may take place (*a*) as a result of improvement in real output per head in all or any of these three fields, or (*b*) as a result of transference of labour from the less productive to the more productive fields. If we can obtain figures showing for a series of dates the distribution of the national income, and also the distribution of the working population, between these three fields, and also if we know the rate of growth of real national income per head as a whole, we will be able to analyse its growth so as to show separately the effects of causes (*a*) and (*b*). We have already shown that long-term economic growth tends to proceed fairly regularly by long spells at a time, and therefore we naturally choose, so far as the statistical sources will allow us, dates fairly near the turning points of these long-period trends. We should then be considerably nearer to an explanation of why rates of economic growth change as they do.

It has been found possible to make such an analysis for eight countries, namely, the U.S.A., Great Britain, France, Japan, Italy, Australia, Sweden and Norway. Germany cannot be included owing to the lack of precise and comprehensive statistics of the net value of industrial output, and the ambiguity of definition between industrialists and craftsmen. The same difficulty occurs in France and Japan, where craftsmen have been included with services. In other countries, however, comprehensive if approximate figures are available covering the output of craftsmen, whenever it is important.

The first table relates to the U.S.A. in 1850 (the first year for which figures are available), in 1870, in 1900 and 1920 (between which years the rate of economic growth was remarkably slowed down), and 1935.

In this and in subsequent tables the method of calculation of the first four columns is clear. For calculating the fifth column, we have, e.g. for U.S.A. in 1850, figures of \$323 per head for average income of the whole community, and 625 I.U. for average real income per worker in work on a 48-hour week basis. Each of the figures in the fourth column is therefore multiplied by $\frac{625}{323}$.

For the first three years the distribution of income between agriculture, manufacture, services and rents is that given by Dr. King. Indirect taxation has been omitted, and incomes paid or received from abroad have been ignored. Figures for 1920 and for 1935 from Dr. Kuznetz's *National Income and Capital Formation.* The amount representing rents of dwellings in the 1935 total is not explicitly stated but appears to be about \$3 milliards. The imputed values of owned homes are not included in 1935.

Distribution of the occupied population is that given by Whelpton up to 1920 (see p. 185). Unemployment as from p. 79 above; is assumed to be negligible in agriculture and the figure is arbitrarily divided between industry and services. For 1935 Kuznetz's figures of the numbers occupied are taken directly, including estimate for unpaid family labour on farms.

Data on physical product per man-hour in manufacturing and in agriculture are also plotted on the chart on p. 347 (from Chapters VII and VIII).

The table and diagram[1] throw remarkable light on the growth of real national income. Attention had already been drawn to the steady rate of growth up to 1900, the general slowing-down of rate of growth between 1900 and 1920, and the marked increase since then in average productivity per worker hour, though much of this increase has been wasted in the form of unemployment.

For these reasons the years 1900 and 1920 were

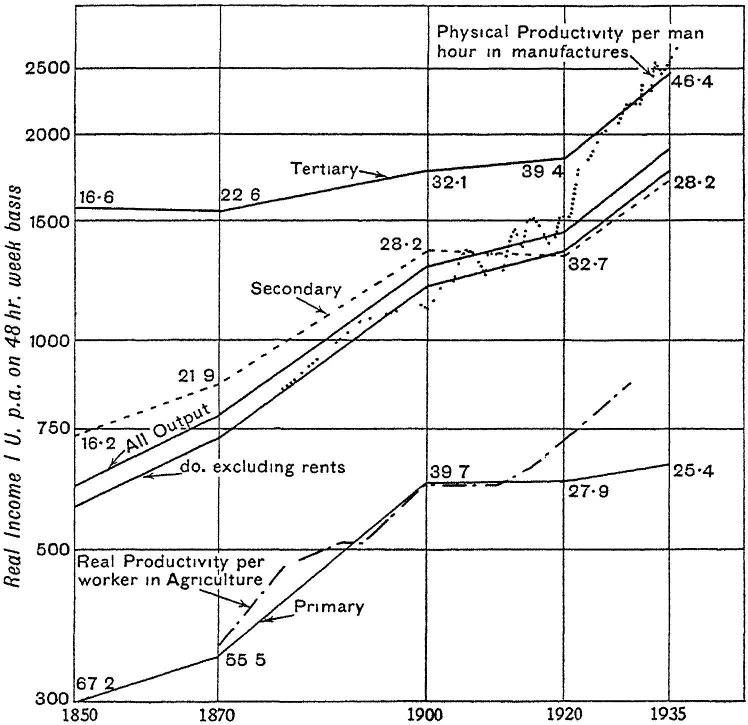
[1] The figures on the faces of the diagrams represent the proportions of the working population engaged in primary, secondary and tertiary industry respectively at each date.

selected as points for special analysis, together with

	Occupied millions	Do., less Unemployed	Income		Income I U Per Person in Work on 48-hour Week Basis
			$ milliard	$ Per Person engaged in the Industry	
1850					
Agriculture . .	4·97	4 97	0 765	154	298
Manufacture, mining and building . .	1·35	1 20	0·457	381	737
Rest, exc. rents	1·38	1·23	0·992	807	1561
TOTAL .	. .	7·39	2 214	299	579
Inc. rents . .	. .	7 39	2 385	323	625
1870					
Agriculture	6·90	6·90	1 78	259	354
Manufacture, etc.	2·92	2 72	1 75	643	878
Rest, exc. rents	3·10	2 80	3 19	1139	1558
TOTAL .	. .	12 42	6·72	540	739
Inc. rents .	. .	12·42	7·18	576	787
1900					
Agriculture .	10 70	10·7	3·69	345	624
Manufacture, etc.	8 45	7 6	5·71	752	1361
Rest, exc. rents .	9 92	8·7	8·56	984	1780
TOTAL	.	27 0	17·96	665	1203
Inc. rents . .	. .	27 0	19·36	716	1293
1920					
Agriculture	11·15	11 1	9·0	810	625
Manufacture, etc.	13·85	13 0	22·1	1701	1313
Rest, exc. rents . .	16 85	15·6	36·9	2366	1828
TOTAL . .	. .	39 7	68·0	1712	1322
Inc. rents . .	.	39·7	72·4	1822	1406
1935					
Agriculture .	.	10 5	4·70	448	669
Manufacture, etc.	.	11·9	13·4	1127	1683
Rest, exc. rents . .	. .	19 95	3·9	1599	2390
TOTAL . .	. .	41 35	50·0	1210	1809
Inc. rents	. .	41 35	53 0	1282	1917

1850, 1870 and 1935, the latter being the last year for which full information was available. Up till 1900, the

rise in average real income per head in primary production was as rapid as in income as a whole. Its subsequent failure to rise, in spite of rising productivity per worker, is due to worsening terms of exchange for agricultural produce. This growth in primary productivity was associated with a rapid decline in the proportion of the



working population engaged in primary production. This was not only a relative decline; from 1900 the absolute growth in the number of primary producers virtually ceased.

But marked though this increase was, the average real income per head of primary producers quite failed to overtake average real income in other fields and remained throughout at almost exactly half the average level of real income of the American community as a

whole. Since 1920 the relative position of the primary producer has very much deteriorated. This has been accompanied by a cessation in the rapid decline of his numbers, and it can hardly be denied that a resumption of the transfer of population away from primary production in the U.S.A. would have the effect of increasing the real income of the remainder of primary producers.

Average real income per head of the population engaged in secondary production rose at a fairly uniform pace from 1850 to 1900. From 1900 to 1920, while the relative numbers of secondary producers increased, there was an apparent fall in their average real income (it is called apparent because net income in 1900 was not calculated on the same basis as in 1920 and may have been overstated). But at any rate, it ceased to grow, in spite of apparent rising productivity per man-hour, owing apparently to absorption of an increasing proportion of the product by charges for depreciation, maintenance and various services. It appears that the slowing-down in the rate of growth of the general average of real income per head between 1900 and 1920 must be attributed to this slowing-down in the rate of increase of secondary productivity, and stagnation of tertiary production per head. Increasing productivity in primary industry and the transfer of labour from primary industry to more productive employments were both factors keeping up the rate of growth of national income over that period.

Between 1920 and 1935 the resumption of growth in the general average of real income per head must be largely attributed to tertiary industries, which not only showed a marked increase in average productivity per person employed, but absorbed 7 per cent of the working population from the less productive secondary and primary industries. Tertiary production per head was at a high but stable level from 1850 to 1920, during which period the proportion of the population engaged rose from 16·6 to 39·4 per cent. After 1920, too, real income per head in secondary industry resumed its upward

trend, with a reduction of the numbers engaged.

The general trend of these figures is confirmed by the data of physical output per head, which show that the real income figures are in the main truly indicative of changes in real productivity and (except in the case of primary production since 1920) not to an alteration in the terms of exchange. The growth of real income in secondary industry was closely paralleled by the figures of real output per head from 1870 to 1900, but from that date physical productivity per man-hour has risen much more rapidly than real income per person engaged in secondary production, and the discrepancy is widening for reasons given above. A subsidiary reason for the discrepancy is the exclusion of building and construction from the figures of physical productivity.

For Great Britain it has been shown that the rate of progress from 1860 to the present time was almost regular, and figures are therefore analysed for three dates only, namely 1867, 1911 and 1930. A most careful and interesting analysis of national income and of the amounts contributed by primary and secondary industries was made by Baxter in a work published in 1868.[1]

The figures for 1911 and 1930 are from the detailed tables in *National Income and Outlay*, pp. 125 and 238 For 1867 Caird's[2] figures are used for agricultural incomes. For other home-produced incomes, rents, and income from overseas, data are those given by Baxter. There are great differences between agricultural productivity per head in Great Britain and Ireland, the latter, however, showing a rapid increase during the period. For this reason the Irish figures are excluded from agricultural population and net output in 1867 and 1911. Other incomes in those years, however, refer to Great Britain and Ireland together. The error involved in this case is not serious.

Baxter's estimate of the net output of agriculture in Great Britain

[1] Entitled *The National Income*, published by Macmillan and Co. The figures were based on a careful examination of Inland Revenue and wage statistics. He also, in the latter part of the book, makes a prophecy which must have been highly unpalatable to English opinion of that date, of the "inevitable growth of the United States to a great naval and manufacturing power" as a result of the victory of the North in the Civil War.

[2] *J.R.S.S.*, 1868, p. 139.

in 1867 was only £122·5 millions as against Caird's £140 3 millions. Caird was working from output figures, and solved the difficult problem of the deductions to be made for fodder consumption by the rough-and-ready method of including the whole gross output of

Home-produced Income	Occupied, thousands	Net Output, £ million	£ per Head	International Units
1867				
Agriculture	2,060	140 3	68·1	581
Manufacture, mining and building	6,120	300	49·0	418
Other, excluding rents . .	4,420	274	62·0	529
TOTAL	12,600	714	56·6	484
TOTAL, including rents and overseas income . .	..	788	62·4	532
1911				
Agriculture	1,500	98	65·3	590
Manufacture, mining and building	8,595	688	80·0	723
Other, excluding rents . .	8,985	920	102·2	925
TOTAL	19,080	1706	84·5	763
TOTAL, including rents and overseas income . .	..	2026	106·2	960
1930				
Agriculture	886	121	136·5	827
Manufacture, mining and building	7,868	1496	190·0	1151
Other, excluding rents . .	9,567	1693	177·1	1072
TOTAL	18,321	3310	181·0	1095
TOTAL, including rents and overseas income . .	..	3802	207 8	1259

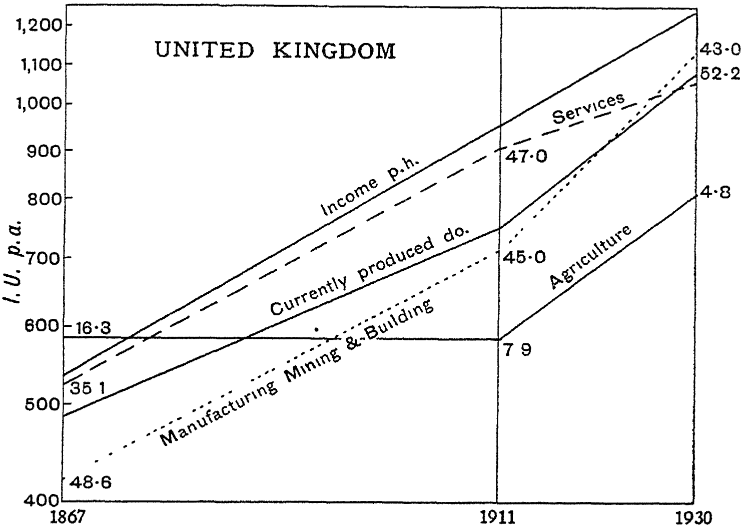
meat, wool and dairy products and excluding the gross output of horses, pig meat, hay and rootcrops (while including all cereals, peas and beans used for fodder). However, his estimate compiled in this way for England and Wales (£117·3 millions) agrees almost exactly with a calculation made by Purdy,[1] the secretary of the Poor Law

[1] *J.R.S.S.*, 1861, p. 328.

Board, who proceeded by quite a different method to obtain net income produced by agriculture in England and Wales in 1860 :

	£ million
Wages	39·0
Remuneration in kind . .	1·0
Income of small-holders	4 0
„ farmers .	21·5
„ bailiffs . .	1·0
„ landowners . .	43·0
Rates and land tax . .	7·6
	117·1

Whether these two distinguished statisticians of the eighteen-sixties may not have adjusted their results to confirm each other is of course another question. But in this case Caird's result is regarded as better confirmed than Baxter's.



The information can be checked against the alternative calculations of the volume of British industrial and agricultural output, made by Dr. Walther Hoffmann and by Dr. Drescher respectively (quoted in Chapters VII and VIII). Dr. Hoffmann's figures show an increase of 50 per cent in production per head of the population employed in industry between 1867 and 1911, as against

73 per cent calculated above. The terms of trade had moved in favour of industry during this period and against agriculture. Between 1867 and 1911 real income per agriculturist remained constant, while his physical productivity per head per year, based on Dr. Drescher's index, rose by 30 per cent and productivity per hour by 40 per cent. Between 1911 and 1930 his real income per hour rose by 40 per cent, and his real productivity per year rose by 6 per cent only and per hour by about 27 per cent. The terms of trade thus moved strongly against British agriculture from 1867 to 1911, but somewhat in its favour from 1911 to 1930, largely owing to the relatively high prices of livestock products in the latter year. The rapid relative and absolute reduction of the number of agriculturists, by reversing the law of diminishing returns, benefits the economy as a whole: and this benefit has been about equally divided between the producer and the buyer of agricultural goods.

Tertiary productivity, unlike that of U.S.A., shows a slowing-down of the rate of increase — an important factor in British welfare as a whole.

For France, calculations can only be made for the three periods 1860–69, 1906 and 1930, and the results in each case are approximate. A Census of industrial production was taken in 1861–65 and not again till 1930! Estimates of the numbers engaged and the net value of output, allowing for omitted returns in both years, have been made by M. Dugé de Bernonville and published in the *Enquête Industrielle* relating to 1930.

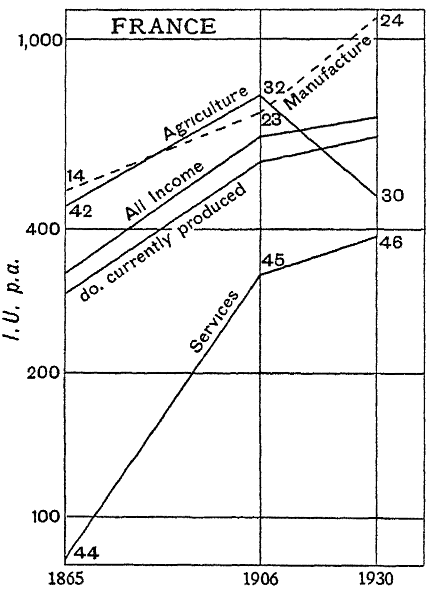
Figures of occupied population are taken from Simiand's *Le Salaire*, vol. iii, and the 1931 Census. He also quotes (pp. 77-8) a rough estimate by de Bernonville of the gross value of industrial output in 1906 and (pp. 93, 95) for each period figures of income derived from rents and from overseas. For 1930 and 1860–65 we have factors for converting gross industrial output to net, and an estimate must be made for the factor applicable to 1906. For the net output of agriculture Simiand quotes an official estimate of the value of crops and meat for 1862 amounting to 8·72 milliards. The corresponding figure for crops and meat only for 1882 was 9·69

milliards. In that year the entire value of produce sold off farms or consumed by the cultivators including milk, wine, fruit and vegetables was 13·46 milliards. After deductions suggested by Coste (*loc. cit.*) for industrial produce consumed, a net figure of 11·3 milliards is obtained. For 1862 an estimate of 11·7 milliards is appropriate. For 1906 the figure for agricultural net output calculated by Pupin (*La Richesse privée française avant la Guerre*) is used, relating to the year 1911.

	Income, milliard francs	Occupied, excluding Agriculture, Females, millions	Income, francs per Head	Real income, per Head in 48-hour Week, International Units
1860–69				
Agriculture	11·7	6·3	860	435
Recorded industry	4·2	2·1	2,000	468
Rest	2·2	6·6	333	78
TOTAL, exc. rents and overseas income	18·1	..	1,208	283
TOTAL	20·0	15·0	1,333	313
1906				
Agriculture	12 7	5·45	2,325	772
Recorded industry	8·4	3·9	2,155	716
Rest	7·6	7·65	995	330
TOTAL, exc. rents and overseas income	28·7	..	1,690	561
TOTAL	33 0	17·0	1,940	644
1930				
Agriculture	51·4	5·5	9,340	500
Recorded industry	100·0	3·9	25,600	1373
Rest	72·6	8·84	8,210	440
TOTAL, exc. rents and overseas income	224·0	..	12,290	658
TOTAL	243·0	18·24	13,320	714

Figures for rents and income from overseas are obtained from Simiand, vol. 3, pp. 95-7. For 1930 the 1924 figures of overseas income are used. Rents are estimated at 1·3 milliards for 1860 and 2·5 milliards for 1906.

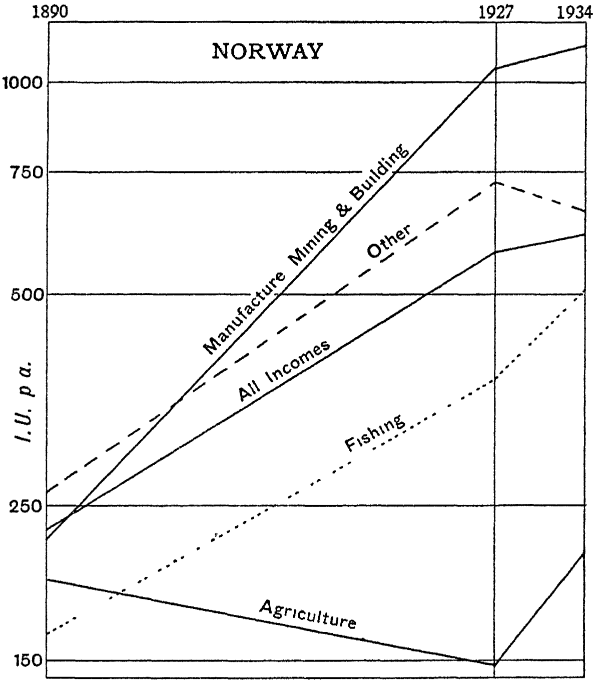
We have here a situation in which tertiary production shows by far the lowest real income per head at the beginning of the period, but rapidly rising as time goes on. The proportion of the population engaged in tertiary production (with which are included in this country, certain small handicrafts not covered by the manufacturing statistics), has remained almost constant. This is a remarkable contrast to the situation in the U.S.A. Tertiary and handicraft labour in the U.S.A. was presumably very scarce in the early years of the nineteenth century, and production therefore efficiently organised in these fields, while the terms of exchange were probably also in their favour. In France, on the other hand, such labour was plentiful and relatively unproductive. Great Britain, it is interesting to see, occupies an intermediate position.



The rise in real income per head of French agriculture between 1865 and 1906, and its subsequent decline, are of considerable interest. It has been shown above that there has been a great decline in productivity from 1906 to the present time. Between 1913 and 1930 the terms of trade between primary and secondary production, as judged by the relative movements of wholesale prices of agricultural and industrial products, moved against agriculture to the extent of 9 per cent only, while between 1906 and 1913 they probably moved slightly in favour of agriculture. It is also of interest

to note that the proportion of the working population engaged in agriculture fell between 1865 and 1906 from 42 to 32 per cent. Between 1906 and 1930, however, the transfer of labour away from agriculture almost ceased.

For Norway, detailed figures were calculated by Kiaer,[1] for the year 1890, independent estimates of national income being made from production and taxation statistics, and these can be compared with figures for recent years. Data are calculated for 1927, the first year for which statistics of industrial output were available, and for 1934. Income from shipping represents a considerable fraction of Norwegian national income, and as this income is produced with comparatively little current expenditure of labour, it is separately analysed.



[1] *J.R.S.S.*, 1891.

The present-day industrial statistics refer only to factory industry employing approximately 100,000 persons, whereas the 1890 figures refer to all industry and handicraft employing 172,000 persons at that date and 310,000 in 1930. For that reason the 1927 and 1934 figures are " diluted " with a proportion corresponding to the numbers in unrecorded industrial employment, whose average productivity per head is assumed to be the same as in services.

	Numbers Occupied, thousands			Income, Million Kroner		
	1890	1927	1934	1890	1927	1934
Agriculture and forestry (inc. females) . .	328	412	412	147	266	289
Fishing . .	57	76	76	21	127	130
Manufacture (covered by factory statistics) .	..	93	113	..	685	686
All manufacture, mining and building . .	172	265	265	89	..	..
Shipping . . .	43	40	40	38·5	160	151
Services . . .	327	415*	431*	196	1262*	935*
TOTAL (exc. unemployed)	927	1036	1072	491	2600	2200

* Inclusive of craftsmen, builders, etc., who will be transferred to industry in the calculation below.

	Average Income per Head, Kroner			Average Income per Head, I U.		
Agriculture and forestry .	449	648	725	195	148	213
Fishing	375	1675	1710	163	382	502
Manufacture (covered by factory statistics) . .	..	7360	6045	..	1678	1780
All manufacture, mining and building . . .	518	4560	3830	225	1040	1123
Shipping	891	..	..	386	..	..
Services	599	3042	2166	260	709	650
TOTAL .	529	2510	2055	230	572	603

The numbers engaged in industry and handicrafts taken together, as shown by the Census, showed a decline between 1920 and 1930, and their numbers (excluding unemployed, whose proportion was high in industry) are assumed to have remained constant at 265,000 between 1927 and 1934.

For recent years figures of gross shipping income are pub-

lished annually, and it is assumed that net income, i.e. the earnings of factors of production engaged in shipping, after deducting payments for fuel, payments overseas, etc , is 38 per cent of gross income. This figure is derived from calculations in *National Income of Sweden*. The number engaged in shipping in recent years is taken at 40,000.[1]

Fishing gross returns are from Fishery Statistics. For agricultural output, official figures of the value of crops and hay produced, together with the amount of butter produced valued at average (Danish) export prices. This treatment of livestock farming is somewhat arbitrary.

The marked rise in average real income per worker-hour is in this case accompanied by almost complete stagnation in real income per head obtained in agriculture and forestry. The numbers employed in these (under Norwegian conditions) remarkably unremunerative occupations have risen from 35·4 per cent of the working population in 1890 to 38·5 per cent in 1930, and are an important factor in keeping down the average level of income. In fishing, on the other hand, the rise in average real income per head has been very marked and it is now not far behind the general average. Manufacturing industry, which in this country is modern and highly specialised, shows exceedingly high average income per head. There is also evidence of a very marked rise in productivity in the tertiary industries.

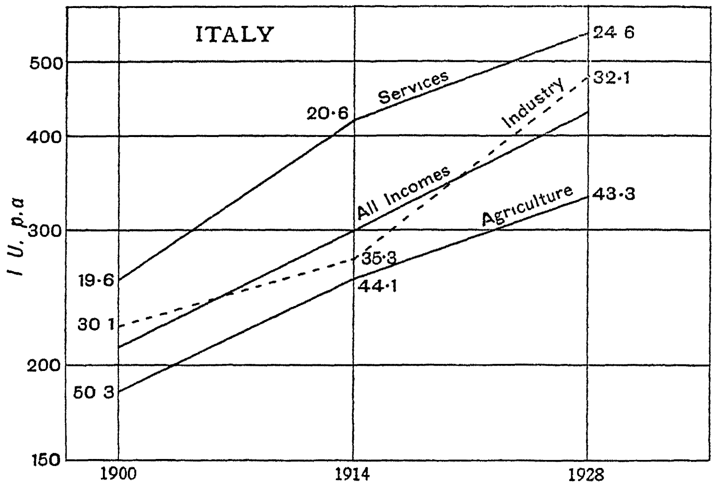
For Italy data are calculated for the three years 1901, 1913 and 1928. Detailed figures for a more recent year

	National Income, milliard lire			Numbers Occupied (millions), excluding Women engaged in Agriculture			Average Income per Head, lire			Ditto, I.U.		
	1901	1913	1928	1901	1913	1928	1901	1913	1928	1901	1913	1928
Agriculture and forestry	4 1	7 0	30	6 4	6 0	6 75	640	1165	4450	183	286	328
Industry	3 0	6 0	32	3 85	4 8	5 0	780	1250	6400	223	307	471
Rest	2 25	5 2	28	2 5	2 8	3 82	900	1857	7330	258	455	541
TOTAL	9 35	18 2	90	18 75	13 6	15 57	734	1337	5785	210	328	426

[1] *League of Nations Statistical Year Book*, 1930. Figures there given relate to 1920 only.

are not available, but there appears to have been a general decline in productivity.

National income figures for 1914 and 1928, subdivided by sources, are those given by Gini, International Institute of Statistics, 19th session. For 1900, figures are those calculated by Bolton King already quoted He gives a detailed estimate of net agricultural output at 4·1 milliard lire. Fiamingo (*Economic Journal*, 1898, p. 260) gives a figure of 5 milliard lire for gross agricultural output at that date. Attolico and Giannini (*J R.S.S.*, 1918, p. 449) give the net income from agriculture in 1880 at 3 milliard lire ; from industry,



0·6 milliard. For 1913 they give figures of 7 milliards and 3 milliards respectively. The former corresponds to Gini's figure but the latter is only half the figure (6 milliards) which Gini gives for the net output of industry in 1914. Gini is presumably dealing, therefore, with a broader definition of industry Assuming a rather less rapid rate of increase than that given by Attolico and Giannini, we may estimate the net output of industry in 1900 at 3 milliards.

The distribution of the occupied population in 1900 is that given in the report of the International Institute of Statistics, 1908 session, with the exclusion of women engaged in agriculture. Income from interest on the national debt is excluded from Gini's figures.

In this case the apparent rise in real incomes in agriculture between 1914 and 1928 is to some extent

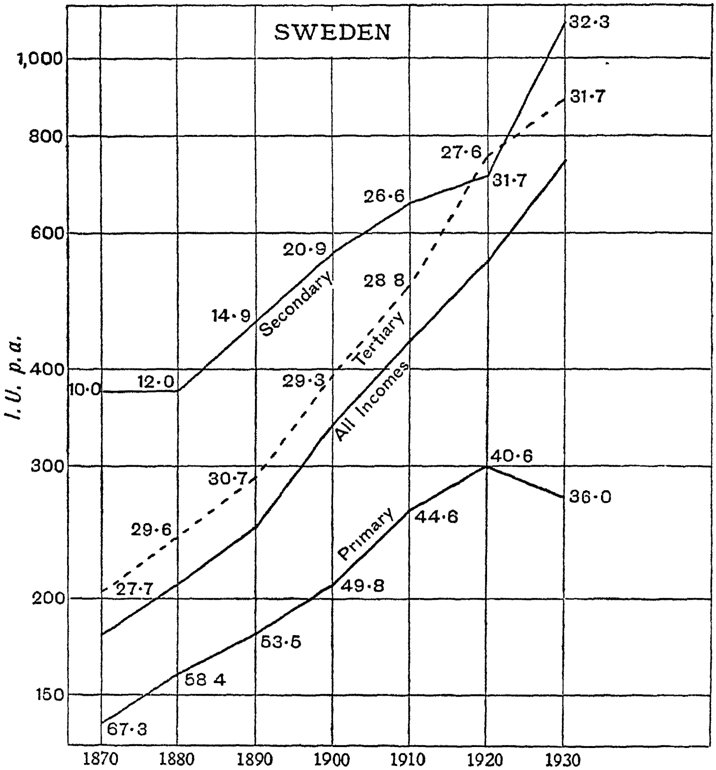
spurious. Average real income per head measured in I.U.'s rose from 328 in 1913 to 426 in 1928; if the reduction of working hours had been ignored, the two figures would have been almost exactly the same. In default of information, we have assumed that this increased leisure is applicable to agriculturists as well. The volume of agricultural production per head was probably less in 1928 than in 1914. Gini (*Economica*, 1926, p. 325) gives the volume of production in agriculture in 1924 at 3 per cent below the 1913 level, with a 12 per cent increase of population. The wholesale price of agricultural produce in 1928 was 530·7 (1913 = 100), reducing the 1928 output to 5·65 milliard lire only at 1913 prices. It appears that agricultural production per head in recent years has been considerably less than in 1913. On the other hand, Professor Spina (*Metron*, 1932) quotes data to show that by 1926–30 the average Italian diet had considerably improved as compared with 1911–13. The discrepancy is explained when we examine the import figures. Substantial quantities of food were imported in 1926–30, but not in 1913. There was a surplus of imports over exports of foodstuffs of 59 million lire in 1913, while in 1928 there was a surplus of imports of 2745 million lire, or 518 million lire at 1913 prices; rather less than a 10 per cent addition to the diet. By 1934, however, there was an export surplus, in foodstuffs, of 522 million lire, or 176 million lire at 1913 prices.

Since 1928, therefore, there has been some deterioration in the average diet, though the supply of industrial goods may have slightly increased. Average real income per head of those in work has been reduced, and the increase in real income between 1914 and 1928, more than in other countries, has taken the form of increased leisure.

In general, the rise of secondary and tertiary productivity has been regular but slow over this period. Since 1928, however, there is evidence to show that real income per head has fallen.

Sweden

In this country, where we have exact information about the national income produced, our main difficulty arises with regard to figures of occupied population. For 1920 and 1930 we have exact figures, but prior to



those years the only continuous figures which can be obtained are those which include dependants with occupied persons.

Figures for each census from 1870 are quoted from the reports of the Unemployment Commission (p. 133). Comparison of these figures with the true figures of 1920 and 1930 show that the analysis of the whole population inclusive of dependants gives by no means the same results as the analysis of the occupied population alone. In 1920, for

instance, 44 per cent of the whole population were reported as attached to agriculture, whereas only 34·3 per cent of the occupied population were found to be actually at work in agriculture. Other attempts at classifying the actual occupied population were made, for 1900, in the 1908 Report of the International Institute of Statistics; and for 1890 by Juraschek in *Die Staaten Europas*. It is found that the numbers actually engaged in both agriculture and industry are considerably less than appears from the proportion of the population attached to them. This is not surprising, as many persons engaged in domestic services, and other service industries, will be classified according to the business of the head of their household, which may be agriculture or industry; and this discrepancy was probably wider in the earlier years. Factors for reduction are obtained by comparing the known distributions for 1890, 1900 and 1920 with the distribution of the whole population, and are used to estimate a continuous series.

Income figures are not taken for the single years, but for the five years of which the Census year is centre (1867–72 inclusive, 1878–82, etc.) except for the year 1930, which is taken singly. As the figures of real income have been calculated per head of the whole population between the ages of 15 and 65, their numbers are again taken as basis, and subdivided between agriculture and industry and services in accordance with the proportions established above. The income figures there used are those calculated according to "Alternative II", i.e. including the output of the building trade in the years in which it was actually performed. Prior to 1896 figures are only available on a different alternative, but can be approximately adjusted. Real income per head in I.U.'s for the country as a whole at Census years is obtained by interpolation from the diagram in Chapter IV.

The agricultural figures in Sweden show a trend similar to those of the U.S.A. In this case, however, they not only fail to overtake, but steadily fall behind, the figures for other incomes. In the early years, the greatest productivity was shown by manufacturing industries, with tertiary productivity at a comparatively low level. The steady and rapid increase of tertiary

productivity is the most striking feature in this country. This, together with a fairly rapid transfer of population away from primary production, has accounted for the accelerating rate of increase in the general level of real

DISTRIBUTION OF TOTAL POPULATION (PER CENT)

	1870	1880	1890	1900	1910	1920	1930
Agriculture and Forestry	72·4	66·9	62·1	55·1	48 8	44 0	34·8
Manufacture, Mining and Building	14 6	17·4	21·7	27·8	32 0	35·0	31·7
Services	13 0	14·7	16·2	17·1	19·2	21·0	33 6

DISTRIBUTION OF OCCUPIED POPULATION (PER CENT) EXCLUDING WOMEN ENGAGED IN AGRICULTURE

	1870	1880	1890	1900	1910	1920	1930
Agriculture and Forestry	(62 3)	(58·4)	53·5	49 8	(44 6)	40·6	36·0
Manufacture, Mining and Building	(10 0)	(12·0)	14 9	20 9	(26 6)	31·7	32 3
Services	(27·7)	(29 6)	30·7	29 3	(28·8)	27 6	31·7

INCOME FOR 5 YEARS CENTRED ON CENSUS YEAR (Million Kronor)

	1870	1880	1890	1900	1910	1920	1930
Agriculture and Forestry	343	442	451	538	725	1848	1052
Manufacture, Mining and Building	150	214	288	625	1093	3446	3785
Services	225	342	412	602	934	3150	2964
TOTAL	718	998	1151	1765	2752	8444	7801

income. During the last decade a great increase in secondary productivity has contributed greatly to the rise in real income, though the secondary industries appear to be unable to employ any larger proportion of the population than they employ now.

The decline in real incomes of primary producers in the last decade can also in this case be largely attributed to adverse terms of exchange.

Population aged 15 to 65 distributed in accordance with Distribution of Occupied Population
(Thousands)

	1870	1880	1890	1900	1910	1920	1930
Agriculture and Forestry . .	1573	1642	1536	1506	1465	1486	1452
Manufacture, Mining and Building	253	338	422	634	875	1160	1304
Services . .	702	834	870	889	947	1010	1279
Total . .	2528	2814	2828	3029	3287	3656	4035

Income per Head
(Kronor)

	1870	1880	1890	1900	1910	1920	1930
Agriculture and Forestry . . .	218	269	294	357	495	1243	726
Manufacture, Mining and Building .	593	633	682	986	1251	2973	2900
Services . . .	321	710	474	677	985	3120	2318
Total . .	284	354	406	583	837	2308	1933

Income per Head
(I.U.)

	1870	1880	1890	1900	1910	1920	1930
Agriculture and Forestry . . .	138	159	179	207	259	301	278
Manufacture, Mining and Building . .	375	374	416	570	655	718	1109
Services . . .	203	242	289	392	515	753	886
Total . .	180	209	248	337	437	558	740

Australia

The growth of Australian national income has been very erratic. The earliest figures, so far as they are reliable, show that the rate of growth was very rapid during the 1880's and that there then followed a long period of stagnation, real income per head in 1920–21 having been little higher than in 1890. From there to 1926–27 was again a period of rapid growth, followed by more moderate growth since. It is not altogether justifiable, however, to take the year 1920–21 as one of the points of measurement, on the grounds that the economic effects of the war had by no means fully disappeared, and figures are taken for the year 1921–22. Measurements are also made in 1926–27, after which year the rate of growth began to slow down, and for 1935–36, in which year real income per head reached its peak. New South Wales data alone are available for the two earlier years of 1886–87 and 1889–90.

The distribution of population and incomes is in accordance with the Australian definitions, where mining is included with primary production, and building and construction are not included with manufacturing production.

Distribution of occupied population and incomes for the last three years is from *National Income of Australia*. The allocation of income between primary, secondary and tertiary production in the earlier years is that given by Coghlan in the *Wealth and Progress of New South Wales*. He also gives the total numbers of occupied population in that state, but their distribution between employments is calculated from figures relating to Australia as a whole (Chapter V). For recent years the occupational distribution in New South Wales has been almost exactly the same as in Australia as a whole, and this is assumed to have been the case in earlier years. The Census figures referred to above include building with industry and this must be eliminated. For 1901 and subsequent years building has always represented between 35 and 40 per cent of the numbers recorded under "industry", and this proportion is presumed to have prevailed in the earlier years.

Here, and nowhere else in the world except possibly in other newly developed countries, we find that over

INCOME PRODUCED, NOT DEDUCTING EXTERNAL INTEREST PAYMENTS
(£ million)

Year	Agriculture, Pastoral and Mining	Manufacture	Rents of Houses	Services	Total Income produced
1886–87 (N.S.W.)	17·75	5·75	7·0	20 0	50 5
1889–90 (N.S.W.)	24·9	5·7	6·12	26·23	62 95
1921–22	156	106	40	238	540
1926–27	194	147	49	341	731
1935–36	175	149	50	330	704

OCCUPIED POPULATION EXCLUDING UNEMPLOYED
(Thousands)

Year	Primary Production	Manufacturing	Building and · Services	Total
1886–87 (N S.W.)	149	89	204	442
1889–90 (N.S.W.)	157	100	233	490
1921–22	575	379	1237	2191
1926–27	575	452	1408	2435
1935–36	600	493	1378	2471

INCOME PER HEAD
(£ per year)

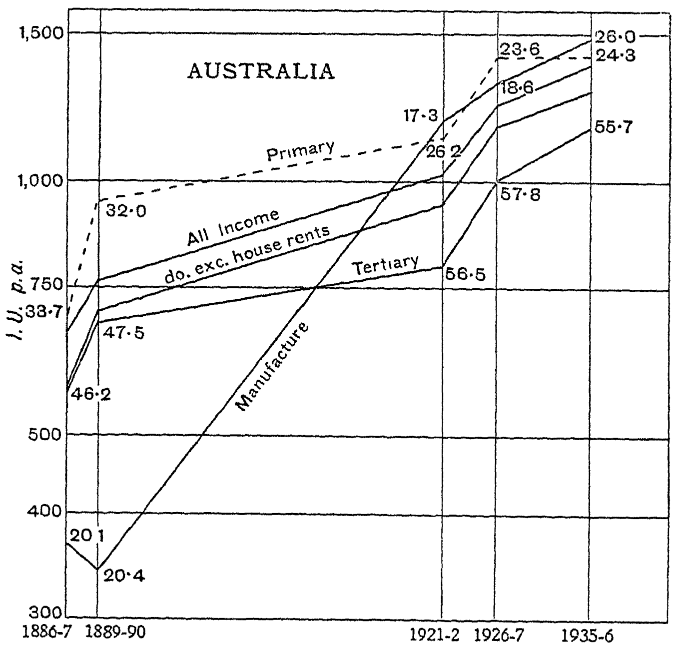
Year	All Incomes	Ditto, excluding Rent	Primary Production	Manufacture	Other, excluding Rent
1886–87 (N.S.W.)	114·1	98·5	119·1	64·6	98·2
1889–90 (N.S.W.)	128·2	115·9	158·7	57 0	112·7
1921–22	246·2	228·1	271·4	279·6	192 4
1926–27	300·2	280·3	337·8	324·8	242 2
1935–36	284·6	264·1	291·4	302·3	239 6

most of the period average real income per head produced in primary industry was in excess of other incomes. As is explained above, the dates are selected to

mark the turning-points of various periods of growth; namely, the period of very rapid expansion which culminated in 1890, the period of stagnation from that date

AVERAGE REAL INCOME PER HEAD
(I.U.)

Year	All Incomes	Ditto, excluding Rent	Primary Production	Manufacturing Production	Building and Services
1886–87 (N S W.)	650	561	678	368	559
1889–90 (N S.W.)	768	693	948	341	674
1921–22	1018	943	1122	1155	795
1926–27	1240	1159	1393	1341	1000
1935–36	..	1277	1408	1461	1148



until 1921, the period of very rapid growth from that date to 1926–27, followed by the period of slower growth.

In the recent period of rapid growth from 1921–22 to

1926–27 it appears that primary, secondary and tertiary industry simultaneously showed a rapid upward movement. Since that date primary productivity appears to have slowed down, while there has been a marked increase in tertiary productivity and a similar increase in secondary productivity. The terms of trade have been artificially altered, however, in favour of secondary production and it appears that the expansion of tertiary productivity has been greater than was supposed. Nevertheless, Australia is one of the few countries in which, throughout the period, tertiary productivity appears to have been lower than that of primary or secondary industry.

During the period 1890 to 1921, when the rate of growth of general average real income per head was slow, there appears to have been a most marked increase in productivity of manufacturing industry, accompanied by an actual decline in the proportion of the population engaged in it. It is doubtful whether the increasing output and employment of secondary industries in recent years under the shelter of higher tariffs have led to an increase in average real productivity per person engaged.

Switzerland

Swiss national income reached a peak in 1929, at which date it was 10·66 milliard francs, or 10·05 milliard francs at 1925–34 prices. Per head of the working population, unemployment being inappreciable, we may put income at 1147 I.U., at that date the highest in Europe.

We may examine the growth to this level from 1890, the first year for which we have data, when average income per head was 609 I.U. Assuming that a 60-hour week then prevailed, this income was 487 I.U. per head only on a 48-hour week basis.

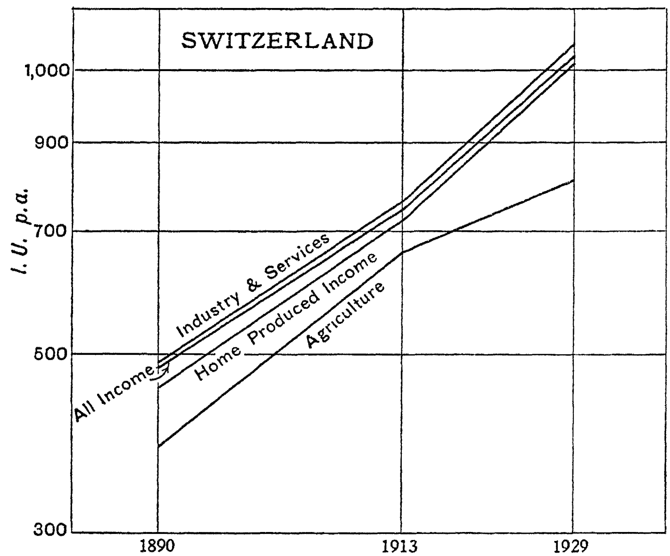
Owing to lack of industrial statistics, the only possible analysis of incomes is into agriculture, overseas investments and other.

For 1890, figures from Geering and Hotz are used. For 1929 the income from overseas investment is quoted by *Economist* (21st April 1934), referring to 1928. In that year overseas investments contributed only 3·2 per cent of the Swiss national income, and income from tourism only 3 per cent, so these popularly supposed sources of Swiss prosperity do not account for very much of it.

	Occupied Population, thousands	Income, milliard francs	Per Head, francs	Per Head, I U on 48-hour Basis
1890				
Agriculture	387	500	1291	385
Other	795	1,310	1648	492
Overseas income	.	120	..	..
TOTAL	1182	1,930	1632	487
Do., home-produced	..	1,810	1531	457
1913				
Agriculture	370	740	2000	667
Other	1320	2,960	2242	748
Overseas income	..	170	..	..
TOTAL	1690	3,870	2290	764
Do., home-produced	..	3,700	2188	731
1929				
Agriculture	365	1,479	4050	816
Other	1507	8,856	5880	1183
Overseas income	..	330	..	..
TOTAL	1872	10,665	5690	1147
Do. home-produced	..	10,335	5530	1123

Several striking features appear here. The relative contribution of overseas interest to national income is actually smaller now than it was in 1890, when it represented 6 per cent of national income. Real agricultural incomes have risen 112 per cent between 1890 and 1929 (or 71 per cent even if we assume that there has been no reduction of the agriculturist's working hours). In no other country has the increase in agri-

cultural incomes been at a rate even approaching that of non-agricultural incomes: and only in Australia and New Zealand do we find so little discrepancy between the present day absolute levels of agricultural and non-agricultural incomes. Since 1929 the relative position of the Swiss agriculturist has still further improved. Between 1929 and 1934 agricultural incomes only fell 17 per cent, while non-agricultural incomes fell 33 per cent.



There is much difference, however, between Australia and New Zealand on the one hand, and Switzerland on the other. Agricultural and pastoral production in the former countries has always been for sale at world prices, while in Switzerland it is for a protected internal market. Swiss farm produce prices in 1933 were only 118 compared with 1906–13 as 100;[1] though Dr. Laur quotes[2] figures to show that Swiss prices for agricultural produce in 1934 were over 80 per cent above the level which they would have been at under free trade.

[1] Laur, International Conference of Agricultural Economists, 1934.
[2] Quoted in *World Economic Survey*, 1934–35, p. 81.

Commodity	Unit	Price in Francs in Switzerland	Estimated Free Trade Price	Weight (from Swiss Agricultural Statistics)	1934 Price in U S A (1909–14 = 100)
Milk .	100 kilos	19·0	12·0	48	95
Pigs .	Kilos live wt.	1·60	0·75	16	68
Cattle .	" "	1·20	0·60	22	
Wheat .	Quintal	36·0	12·0	7	93
Eggs .	100 kilos	12·0	7·0	7	89

The Swiss price index for farm products may be put at 116 for 1934 (on the basis of changes in the food wholesale price index number), and from the weighted average calculated above we conclude that the corresponding free trade price would be only 64. American prices of farm produce, using Swiss weights, were only 84 in 1934 (1909–14 = 100), or 49·6 in gold. The British price index (1913 = 100) for foodstuffs in 1934 gives 104·8, or 65 gold. It is reasonable that the Swiss figures should agree with the British rather than American, for the former include freights and other charges entering (presumably) into Dr. Laur's hypothetical free trade prices for Switzerland.

We thus confirm a figure of 16 per cent as the rise in price of farm produce between 1906–13 and 1934. Agricultural output in the latter year, at 1913 prices, was therefore 1060 milliard francs as against 740 milliard francs in 1913, with 2·3 per cent more agriculturists at work in 1913, and probably with longer working hours. The rise in real productivity per head in agriculture has therefore been quite remarkable.

The retail price of goods other than foodstuffs in Switzerland rose about 65 per cent between 1914 and 1929. If we can take this as a measure of prices for all other output, output per head in 1929, at 1914 prices, becomes $\frac{5880}{1\cdot65}$ or 3560 francs as against 2242 in 1913, a rise in real productivity per head of 59 per cent as against 48 per cent in agriculture.

Japan

Calculation is made for the years 1887, 1897, 1914, 1931 and 1934. A large amount of industrial work is

still done by craftsmen and in small workshops employing under five persons not covered by the factory statistics. No information about these being available they are placed in the residue with services.

OCCUPIED PERSONS

(Millions : excluding women engaged in agriculture)

	1887	1897	1914	1931	1934
Agriculture and Fishing	9·3	9·5	8·6	8·3	7·8
Manufacture (factories)	5·2	7·3	1·19	2·01	2·60
Other	..	..	10·1	12·7	13·1
TOTAL	14·5	16·8	19·9	23 0	23·4

AGGREGATE INCOME

(Million yen : 1925 prices for 1914 and earlier years)

	1887	1897	1914	1931	1934
Agriculture and Fishing	1860	1950	1625	1329	1,670
Manufacture (factories)	1065	1460	560	2161	3,650
Other	..	..	1045	5425	7,180
TOTAL	2925	3410	3230	8915	12,500

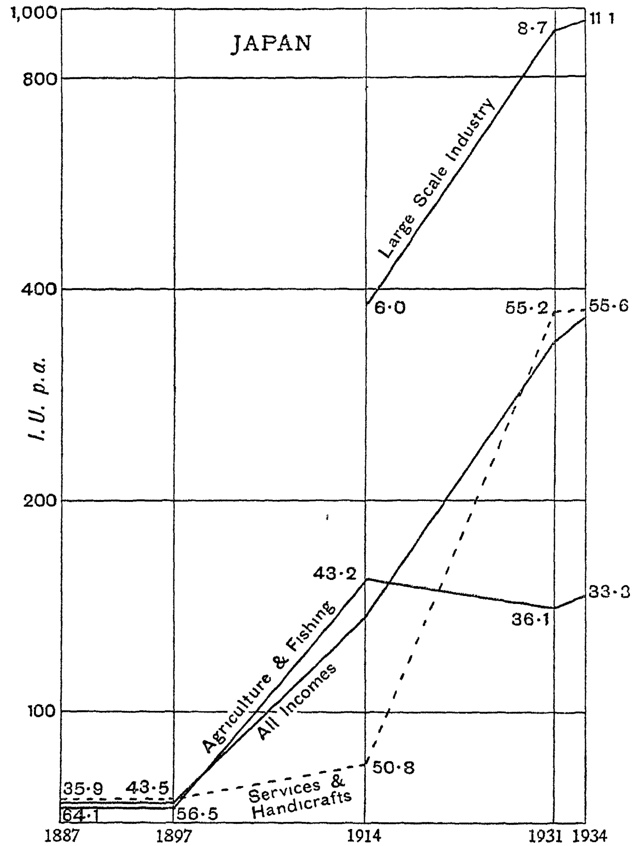
AVERAGE REAL INCOME PER HEAD

(I U.)

	1887	1897	1914	1931	1934
Agriculture and Fishing	73	73	154	140	146
Manufacture (factories)	75	75	382	935	959
Other	..	..	84	372	374
TOTAL	74	74	132	338	365

Figures of the value of agricultural and other incomes at 1925 prices, and the numbers engaged, are given for the earlier years on page 116 above. Statistics of factory production are available for 1914 but not for the earlier years. The ratio of net to gross factory output in 1914 is assumed to be the same as in post-war years.

Large-scale industry, as we have called it, employed 6 per cent of the working population in 1914, and now employs 11 per cent. It has clearly made a very great contribution to the raising of average real income per head. Even if, as appears quite probable, productivity



per head in large-scale industry will not rise much above the figure of 1000 units, it can still make a contribution to increasing the average real income per head in Japan if a portion of the population can be transferred to it from less remunerative activities.

More surprising, and probably more important in the

aggregate, is the great increase in the productivity of service and handicraft industries between 1914 and the present day. Very little attention has been paid by outside writers to this aspect of Japan's economic life, as compared with the great attention which has been given to large scale factory production.

The productivity of agriculture was greatly increased between 1897 and 1914, during which period it occupied a rapidly diminishing proportion of the population. Since 1914 the relative transfer away from agriculture has continued and even the absolute numbers engaged in it have declined. Nevertheless real income produced per head is below the 1914 level.

CHAPTER XI

THE RÔLE OF CAPITAL IN ECONOMIC PROGRESS

CHANGES in the rate of accumulation of capital have a dominating influence on the trade cycle and on the level of unemployment. But this group of phenomena does not concern us at the moment and will be dealt with in a later chapter. Here we are concerned with the relation between long-period economic progress and the accumulation of capital. In effect we must assess the long-period marginal productivity of capital, that is to say, the increase in annual real income in any community consequential upon an increase in its stock of real capital, other factors remaining unchanged.

We may expect to find (as we do find) that the marginal productivity of capital is higher or lower in some places and times than others. But we must not fall into the old-fashioned error of regarding the accumulation of capital as the limiting factor in economic progress. Possibly it is not even the predominant factor.

The tedious and intractable problems of measuring real national income are child's play in comparison with the difficulties of measuring real national capital. The present writer is by no means alone among the present generation of statisticians in much preferring to keep clear of this problem. Nineteenth century statisticians, with perhaps a less acute sense of the difficulties both of theory and of measurement, were very free with estimates of national capital. It is perhaps significant that in France much more importance has hitherto been attached to the measurement of national capital than to the measurement of national income.[1] It is only com-

[1] Bismarck in fixing the French war indemnity, in 1871, quoted, much to the French Government's embarrassment, a number of inflated estimates of national wealth which had recently been made by French statisticians.

paratively recently that the enhancement of real national income, rather than the accumulation of capital wealth as such, has come to be regarded as the main desideratum of economic progress.

The first difficulties of measurement are theoretical. There are three entirely separate concepts of the basis on which capital can be measured, namely *market value*, *replacement value* and *cost price*. In the case of consumable goods, such difficulties do not arise. Cost price, market value, and replacement value cannot differ to any great extent. But in the case of durable commodities wide differences can and do occur. Buildings and public works constructions, representing at once the most important and most durable forms of capital, show the greatest divergencies. Anywhere in the world now, for example, a representative building whose cost price was £1000 when it was constructed thirty years ago, might have a current replacement value of say, £3000 and a market value depending on the demand for building accommodation, laws and customs controlling rents, and the rate of interest, which would be somewhere between the cost price and the replacement value. All that can be said is that with the lapse of time there are forces tending gradually to bring the three values together. If replacement value is high relative to market value, there will be no incentive to erect new buildings, as has indeed actually been the case in many countries in the last twenty years.

It will readily be seen that the method of valuing capital in accordance with its market value allows changes in the rate of interest to play a determining rôle. It is almost true to say that the aggregate of capital determined by market values will tell us nothing more than the amount of national income accruing each year to property, multiplied by the reciprocal of the rate of interest. This is not entirely true, as institutional and subjective elements will enter into the market valuation of many types of property, but it is very nearly the case. There are some who find in economic theory a valid

basis for the valuation of capital in these terms,[1] on the grounds that any change in the subjective valuation of future goods in terms of the present must be taken into account in capital theory and in the measurement of capital. This view is not generally accepted. It is generally held that measurements of capital should proceed by the method of index numbers to determine the quantities of capital goods in existence in more or less the same way as the index number method is used to determine the real national income. The measurement of capital in terms of money value is thus ruled out except as the initial stage in more complete determinations.

If "real capital" is the object of our investigation, it does not matter whether it has been measured in terms of replacement cost or of original cost so long as the measurements have been consistent and index numbers can be constructed to deflate the recorded values. In the case of the American statistics quoted below, for example, measurements were generally made at original cost and can be correspondingly deflated. Figures for Great Britain, however, have been measured throughout at market value. In this case the figures are deflated by an index figure of replacement costs multiplied by the reciprocal of the rate of interest. This method is rough and ready. It is based on the considerations that changes in the rate of interest will cause (after some delay) inversely proportional changes in the market value of any given quantity of fixed capital assets, but at the same time there will always be forces at work tending to bring market values and replacement values into line. This method cannot be expected to give exact results year by year (e.g. apparent changes in real capital over the period 1928–35 referred to below), but should be fairly satisfactory for long-period measurements.

Few branches of economic research owe so much to the work of one man, as does the study of the marginal productivity of capital owe to Professor P. H. Douglas and his assistants. Professor Douglas has compiled series

[1] See for instance Morgenstern, quoted on p. 130 above.

of the growth of real capital in the U.S.A.[1] from 1880 to 1919, and in Great Britain[2] from 1865 to 1914, and has measured, for manufacturing industry, not only the real quantity of capital but also its marginal productivity for the U.S.A., Massachusetts and two Australian States.[3]

It is a mistake to assume that formulae for the marginal productivity of capital obtained by analysis of statistics for manufacturing industry will be applicable to other forms of economic activity, or even that manufacturing industry now represents the most important form of capital investment. Nevertheless it represents the most tangible element in the problem on which to make a beginning and Professor Douglas's results in this sphere are of absorbing interest, and point the way to the determination of the marginal productivity of capital in the sphere of production as a whole.

Professor Douglas's first investigations, published in 1926, measured the amount of fixed capital used in manufacturing industries in the U.S.A. between 1899 and 1922. He also measured the " quantity " of labour employed by these industries over the same period (taking into account changes in the average length of the working week and in the relative proportions of clerical and administrative to manual labour) and compared these with index numbers of the physical volume of product obtained, obtaining a functional relationship. He also computed data over a similar period for the State of Massachusetts and for the two Australian States of New South Wales and Victoria.

Describing output as P and the quantities of labour and capital as L and C, Professor Douglas, working in association with Professor Cobb, sought to obtain a functional relationship :

$$P = f(L, C)$$

assuming that $mP = f(mL, mC)$

where m is any constant.

[1] In *The Theory of Wages*, pp. 464-5.

[2] *Journal of Economic and Business History*, August 1930.

[3] *The Theory of Wages* and *Quarterly Journal of Economics*, November, 1937.

Thus in effect he assumed that the productivity function must be a homogeneous linear function of the first order. He thus assumed away the possibility of general increasing returns or general diminishing returns. An improved version of the formula in which this consideration is taken into account is discussed below.

Professor Cobb after numerous experiments, suggested a suitable type of function, satisfying the above condition, and also satisfying the condition that when either L or C is zero, the product P must also be zero, namely:

$$f(\mathrm{L}, \mathrm{C}) = b\mathrm{L}^{k}\,\mathrm{C}^{1-k},$$

where k and b are constants.

Fitting constants by the method of least squares, Douglas and Cobb obtained for the U.S.A. over this period the relationship:

$$\mathrm{P} = 1{\cdot}01 \quad \mathrm{L}^{0\cdot75}\,\mathrm{C}^{0\cdot25}.$$

Results computed from this formula agree very closely with the actual data.

The best check of this formula, in the first instance, is provided by using entirely independent data for the state of Massachusetts (covering the period 1890–1926). The formula obtained, using a similar technique, was found to be:

$$\mathrm{P} = 1{\cdot}007 \quad \mathrm{L}^{0\cdot743}\,\mathrm{C}^{0\cdot257}.$$

The extraordinary similarity of the constants to those determined for U.S.A. as a whole should convince even the most sceptical that there must be something behind this formula. It must, however, be admitted that for Massachusetts the fit was not nearly as close as for the U.S.A. During the years 1914 to 1920 the actual product was anything from 6 to 17 per cent below that computed by the formula, while from 1922 onwards the actual product was 10 to 20 per cent in excess of that computed by the formula. It is found below that the formula for U.S.A. as a whole ceased to apply after 1922.

But over the period 1899–1920 it seems to be established that some such formula held with considerable precision.

To obtain an external check Professor Douglas turned his attention to Australian statistics. For manufacturing industries in the State of New South Wales over the period 1901–27, working in the same way, he obtained a formula:

$$P = 1{\cdot}02 \quad L^{0\cdot65}\, C^{0\cdot35}.$$

The volume of production, which showed a threefold increase over this period, was predicted by the formula with an average error of 2·5 per cent, and a maximum error of 6 per cent (for 1915 under abnormal war conditions). For the State of Victoria, again using the same technique, he obtained a formula, relating to the period 1907–29, of

$$P = 0{\cdot}97 \quad L^{0\cdot71}\, C^{0\cdot29}.$$

In this case the volume of production was more than doubled and its course predicted with an average error of 5 per cent. During the last three years, in this case, the actual production was considerably in excess of computed value.

Professor Douglas's results have been frequently criticised, both by those who understand them and by those who do not. Prominent in the latter category is an outrageous outburst by Professor Cassell. But perhaps the most careful criticism is that of Dr. Mendershausen,[1] who shows that Professor Douglas's results are very dependent on the data of certain exceptional years, and suggests that the relationship may be spurious as P, L and C are each highly correlated with time. That the relationship is not spurious is shown below, by the establishment of a "spatial" as well as of a time-series relationship, and by other tests.

Professor Douglas has also recently undertaken[2] two supplementary studies. The first is an analysis of the

[1] *Econometrica*, April 1938.

[2] Privately communicated.

equation of production for the year 1909 (the last year for which capital figures are available by industries) in American manufacturing. "We have taken some 90 industries with each as an observation, and have found :

(1) The numbers employed ;
(2) Total capital in money terms both fixed and working ;
(3) Value of the product added by manufacturing in dollars ;

and we have then tried to get the exponents for labour and capital. Interestingly enough, the exponent for labour is 0·76 and for capital 0·24, which checks almost precisely with the results for the historical study which Cobb and I made. And we get virtually the same exponents when we remove the condition that their sum must be equal to unity.

"The second study is a cross-section analysis of Victoria for the years 1910–11, 1923–24, 1927–28, and for the entire Commonwealth of Australia 1934–35. We have not finished our work on the last two years as yet, but for the first year we get an exponent of 0·74 or 0·75 for labour, and about 0·25 for capital ; and virtually the same results when we remove the condition that the sum of the exponents must be equal to unity. For 1923–24, however, we get somewhat differing results, namely, exponents of 0·62 and 0·38. Here, however, when we compute the exponent for capital independently, the sum amounts to about only 0·94 instead of 1·0."

This, together with other comparisons made below, at any rate dispels the contention that the whole relationship is a chance one, whatever criticisms may be applied to the original formula.

For further investigation, the formula will be re-written as below :

$$\text{Log}\left(\frac{\text{P}}{\text{L}}\right) = \log b + (1 - k) \log \left(\frac{\text{C}}{\text{L}}\right).$$

Statistical comparisons will then be made of P/L and C/L at various times and places.

In the next stage we may examine the up-to-date figures for both U.S.A. and Australia, to see how the formulae have worked during recent years. These calculations have been made by Mr. H. J. Goodes of the University of Western Australia.

PRODUCTION SERIES

U.S.A.—Prof. Douglas's Figures Brought Down to 1937

Year	Capital				Labour			Production			
	Continuation of Douglas (p 121, cols 4 and 5)				Continuation of Douglas (Standard Man-hour Index p 126, col 4)			Douglas, p 127			
	Base 1889		1919 Base	C/P	Base 1889		1919 Base	Base 1889		1919 Base	L/P
	C	Douglas			L	Douglas		P	Douglas		
1919	372	387	100	165	195 5	195 9	100	225	218	100	86 5
1920	375	407	101	160	195 5	194 4	100	233	231	104	83
1921	372	417	100	207	141	146 4	75	179	179	79 5	79
1922	375	431	101	162	166 5	160 5	85	231	240	102 5	72
1923	381	.	102	141	191	..	98	271	..	120 5	71
1924	384	.	103	153	168 5	.	86	252	..	112	67
1925	389		104 5	138	175	..	89 5	282	..	125	62
1926	397	.	107	137	182	.	93	289	.	129	63
1927	398	.	107	140	178		91	284	.	126	63
1928	405		109	135	177	.	91	300	.	133	59
1929	418		112 5	132	189		97	318	..	142	59
1930	416	.	112	163	156		80	254	..	113	61
1931	405	.	109	189	123	..	63	214	..	95	58
1932	386	..	104	228	95 5	.	49	169	.	75	56
1933	370	.	100	183	103		53	202	.	90	51
1934	358	..	96 5	171	111	..	57	208		93	53
1935	348		94	144	122		62 5	242	.	107	50
1936	351	..	94 5	124	137		70	282	.	125	49
1937	368	..	99	126	145	.	74 5	292		130	50

Capital. — *National Income and Capital Formation*, by Dr. Kuznetz, National Bureau of Economic Research, and Census of Manufactures, analysed to show manufacturing capital only.

Labour. — Salaried Workers and Wage Earners — numbers from Census of Manufactures. Interpolated by Index of Employment. Hours of Labour — actual time worked, from National Industrial Conference Board, and Douglas, p. 126.

Production. — Federal Reserve Board Index.

For labour we have taken man-hours as against Douglas's wage-earners employed. Since he shows that the two indexes run together no error is introduced by splicing ours to his.

The index of the volume of labour employed in manufacturing falls over the period examined from 195 in

1919 to 145 in 1937. Employment never reached the 1919 and 1920 level again. 1932 was the year of lowest employment in manufacturing (95·5), or less than one-half of the 1919 figure.

From these two indexes the conclusion is drawn that a decreasing labour force has been accompanied by an increasing output. The coefficient L/P shows this trend which has been more marked since 1923. Just one-half of the labour was necessary in 1936 to produce a given volume of output than was the case in 1899.

Professor Douglas states that he expected an increase in capital after 1922 — a *greater rate* of increase than that of 1919–22 shown above. Our capital index shows a rise to 1929, then a fall back below the 1919 level in 1934–35–1936, rising to about the 1919 level in 1937.

Figures of Capital Assets taken from Corporation Income Tax Returns tend to confirm our index — at least for the years of tax statistics we have. These returns give $25·46 milliards as value of capital assets (land, buildings and machinery) for 1925 and $25·62 milliards for 1932. If the *increments* between these years are brought to 1929 prices, the end quantities are 25·36 and 25·45. Our values for these years (1880 prices) are 17·35 and 17·17. *After* 1925, we may therefore safely say, there was no net addition to the quantity of manufacturing capital up to 1932 — a very remarkable conclusion.

Since 1922, therefore, the U.S.A. has witnessed a rapid expansion in the volume of manufacturing output with a decline not only in the labour force but also in the quantity of fixed capital used. This is indeed confirmatory of the idea previously suggested that about the year 1920 some radical change came over the whole productive system of the U.S.A., leading to an immense and consistent increase in productivity per worker-hour.

The next test was applied to Australian statistics by comparison of the years 1926–27 and 1935–36. Victoria and New South Wales between them comprehend the greater part of Australian manufacturing industry, and

it was assumed that the Victorian formula should be applicable to conditions of production in Australia as a whole. It was necessary to include mining with manufacturing industry in this case, for two reasons ; in the first place, a number of coal and ore mines are owned by manufacturing concerns, and their output forms a substantial part of the final output of industry ; and in the second place, our method of computing the increase in capital makes it impossible to distinguish between mining and manufacturing machinery.

The results obtained were as follows, for Australian manufacturing and mining industry taken as a whole :

	1926–27	1935–36
Labour	100	111·5
Capital	100	112·6
Production	100	106·5

Sources.—Article by Douglas and Handsaker in *Quarterly Journal*, November 1937. Theory worked out for Victoria.

Capital Index.—Production and net imports and machinery in Australia, less depreciation (shown in Production Bulletin) revalued at 1926–27 prices and added to capital figures for 1926–27. This calculation was made before Dr. Wilson's figures were available, but they give much the same results. Indexes to deflate additions to plant and buildings from Labour Reports for Wholesale Indexes and Wages Indexes.

Labour Index.—Production Bulletins for employment, manufacturing and mining. Hours worked per week from Labour Reports.

Production Index.—Net manufacturing outputs from Production Bulletins. Manufacturing output deflated by specially constructed index. Mining output from index of output of principal products weighted by 1926–27 values.

At 106·5 the production index is possibly understated, but it is not easy to identify any erroneous element. Douglas and Handsaker used physical data for their production index for Victoria. Evidently a similar method was used for N.S.W. (Douglas, p. 167). Our method was to compare total value added in manufacture and mining at the end-years and deflate the figure for the final year by our index for manufacturing prices in manufacture. Taking manufacturing alone, the index is 109 for 1935–36.

Even the higher value for the production index is unexpected, since all the Douglas curves show production lying *between* capital and labour. Our results put production below the other curves. It is quite probable that a condition of generally diminishing (real) returns has prevailed in Australian industry in these years, which were years of rapid extension into new fields. In other words, the original formulae, applicable in both countries up till about 1920, have subsequently been invalidated by increasing returns in the U.S.A. and by decreasing returns in Australia.

A further investigation along these lines for New Zealand has just been completed by Dr. Max Brown,[1] covering manufacturing industry for the period 1915–16 to 1934–35. The best fit is given by the formula

$$P = 1{\cdot}041\ C^{0\cdot483}\ L^{0\cdot517},$$

as is shown by the following table of computed and actual volume of output (1918–19 = 1,000):

Years	Computed	Actual	Years	Computed	Actual
1915–16	948	949	1926–27	1563	1513
1918–19	1041	1000	1927–28	1597	1565
1919–20	1124	1049	1928–29	1666	1666
1920–21	1210	1215	1929–30	1754	1726
1921–22	1146	1187	1930–31	1717	1668
1922–23	1212	1299	1931–32	1492	1508
1923–24	1274	1313	1932–33	1505	1513
1924–25	1369	1417	1933–34	1536	1579
1925–26	1510	1483	1934–35	1651	1631

The exponent of C in this case is remarkably high. There is no evidence of any general tendency towards increasing or diminishing returns over this period.

Let us summarise our results thus far. From the beginning of the century to the early 1920's manufacturing production increased in the U.S.A. in accordance with a formula approximately

$$P = 1{\cdot}01\quad C^{0\cdot25}\ L^{0\cdot75}.$$

[1] Of the University of New Zealand: unpublished thesis submitted to Cambridge University.

In Australia production was determined by somewhat similar formulae, but with lower exponents for L and higher exponents for C. As Douglas shows, the marginal productivity of capital is related to the exponent, for the partial differentiation of P with respect to C will give the increment of output consequential upon an increment of capital:

$$P = bC^{1-k}L^{k},$$

$$\frac{\partial P}{\partial C} = (1-k)bC^{-k}L^{k} = (1-k)\frac{P}{C}.$$

In other words, the marginal productivity of capital is inversely proportional to the amount of capital at present in use per unit of output (which is not surprising) and also to the exponent of capital $(1-k)$ in the above formula. Thus, at a given level of capital per unit of output, capital in Australia would be expected to have a higher marginal productivity than in America in the ratio

$$0{\cdot}3 : 0{\cdot}25.$$

In New Zealand we obtain a still higher exponent for C.

Since the strange turning point of the early 1920's in America and since the extension of manufacturing production into a number of new fields in Australia (under shelter of higher tariffs and a depreciated exchange), a régime of increasing returns appears to have set in in America, of decreasing returns (to be hoped only temporarily) in Australia. So violent was the tendency to increasing returns in the U.S.A. that a greatly increased output was produced from a stationary volume of factors of production. Indeed the orthodox definition of increasing returns can hardly be said to apply in this case, and the statement will be more precise if we put it in the form that there was a very marked diminution of real costs as the volume of manufacturing output rose. In Australia, decreasing returns were shown in the orthodox manner as an increase in the volume of factors employed failing to produce a proportionate increase in output.

Refinement of the Douglas-Cobb formula, making

provision for the possibility of generally increasing or diminishing returns is suggested by Mr. Wilcox.[1] Mr. Wilcox's formulation is most ingenious. He introduces a factor R :

$$R = \sqrt{L^2 + C^2}.$$

He tests the introduction of R into the formula by least squares. If it shows a significant exponent this will represent the influence of any general tendency towards increasing or diminishing returns, on top of the specific influences of L and C. Refitting the original data to the Wilcox formula, the result obtained was

$$P = 1{\cdot}06 \quad R^{-0{\cdot}15} \quad L^{0{\cdot}79} \quad C^{0{\cdot}36}.$$

There appears to have been therefore a slight tendency towards diminishing return to the factors of production in general over the period 1899 to 1922. This exponent presumably became positive in the period of increasing returns after 1922.

It appears that the Wilcox formula should be used as the point of departure for further investigations in this field.

When we turn from manufacturing capital to the wider field of capital in general, however, we get very different results. Unexpectedly, the marginal productivity of capital in many non-manufacturing fields seems to be much higher than in manufacturing industry. Data in this case are from the more complete calculation undertaken by Professor Douglas,[2] including all capital in manufacturing, steam railroads, street railways, telegraph, telephone, electric light and power, farm machinery, productive farm buildings and livestock. These figures have been very approximately brought up to date by use of Kuznetz's figures of net capital formation[3]

[1] *The Theory of Wages*, p. 224.

[2] Quoted in *The Theory of Wages*, pp. 464-5.

[3] Dr. Kuznetz himself does not attempt to link his figures to pre-1919 data. Based on the official estimate for 1922, omitting land values and consumers capital other than dwelling-houses, he finds the aggregate stock of capital in the U.S.A. (at 1929 prices) to have been \$165·3 milliards at the beginning of 1919, \$249·6 milliards at the end of 1929 and \$239·1 milliards at the end of 1935.

quoted in "National Income and Capital Formation" since 1919, excluding residential real estate, inventories and foreign investment. The rapid rate of growth shown by these figures, as compared with the cessation of growth in capital in manufacture is in itself an indication that the marginal productivity of capital in manufacturing industry must be lower than in other uses.

In comparing these figures with statistics of employment and incomes, account must be taken of changes in working hours, and changes in the relative numbers of different types of worker. For manufacturing industry Douglas showed that these two trends cancelled each other out. In the American national income in general this is certainly not the case. Figures from p. 208 above are taken to show the decline in the relative numbers of the less productive types of labour, such as farm workers, and increasing relative numbers of the more productive types. Choosing arbitrary units (each unit represents approximately the ability to earn $500 per year at the present day), we obtain the following table (p. 388) showing a 38 per cent increase in the average number of units per hundred of working population between 1880 and 1930. Taking this factor into account, we can compute the change in the average real income per head, with a given length of working week, and with a given composition of the labour force, and compared with the figures of capital.

From the diagram on p. 390 it is seen that the slope of the curve[1] relating log P/L to log C/L and therefore indicative of the exponent of capital in the productivity formula, is about 0·36 over the period 1890–1920. The slope of the curve, however, has a strong tendency to increase indicative of a general tendency towards increasing returns over the whole period. The period 1899 to 1922 happens to have been one in which the tendency to increasing returns was for the time being withheld.

Critics, as pointed out above, have urged the possibility that there is a considerable element of chance in

[1] $P = b\,C^{1-k}\,L^{k}$;

$$\therefore \frac{P}{L} = b\left(\frac{C}{L}\right)^{1-k};$$

$$\therefore \log\left(\frac{P}{L}\right) = (1-k)\,\mathrm{Log}\left(\frac{C}{L}\right) + \log b.$$

these results. There may have been forces exerting a general upward influence on productivity, related to the growth of technical knowledge or to the mere lapse of time. The fact that capital was also increasing may have been merely a chance factor and the correlations between capital and productivity spurious.

	" Units "	Product of Units and Relative Numbers					
		1880	1890	1900	1910	1920	1930
Farm labourers	1	19 1	13 2	15·2	16 1	10·0	9 0
Farmers	2	49·2	47·2	39·6	32·6	31 0	24·8
Proprietors, officials and professional	10	84·0	108·0	116·0	129 0	142·0	166 0
Clerical	4	12·0	17·2	18·4	25·2	38 4	58 4
Domestics	$1\frac{1}{2}$	9·3	9·6	7·5	6·2	4 6	6·2
Industrial and unclassified	3	115·9	124·5	131·5	132·7	142 5	130 7
Number of " units " per 100 of working population	..	289·6	319 7	328·2	341 8	368 5	395 1

Years	Capital at 1880 Prices, $ milliard	Labour Unity *	Average Hours, per week	Real Income, milliard	Real Income per Worker per 48-hour Week with 1930 Composition of Labour Forces	Capital per Labour Unit (Arbitrary Units)
1880	9·76	16·0	59 0	17·97	1247	678
1890	18·40	21·6	56·4	27·2	1325	897
1900	25·94	27·0	55·3	40·2	1555	1003
1909–13	46·75	35·2	52·4	52·0	1563	1408
1914–21	58·3	38·0	49·6	57·5	1642	1661
1922–29	72·3	42·8	47·6	70·0	1718	1775

* 1930 occupational distribution taken as standard

It is possible further to test this situation by examining productivity in a number of different countries at a single moment of time. This is possible for the year 1913, in relation to which year Lord Stamp[1] made a unique collection of data compiled on a comparable basis throughout the world. Owing to the violent disturbances of property values in subsequent years, no such compilation for any later date has been feasible.

[1] *J.R.S.S.*, July 1919.

Land values, national debts and capital held overseas are excluded. For the U.S A. the official figures on which Lord Stamp worked included a very large entry of $34 milliards for working capital — very large in relation to the actual figures of stocks held by wholesalers and retailers ascertained by the 1929 Census of Distribution. Half of these figures for 1913 are, therefore, excluded. The division of real property in the U S.A. into "land values" and "buildings" is not given, and the value of buildings is taken from King's figures (quoted below). Lord Stamp expressed his figures in £s per head of population, and in the following table they are re-expressed in terms of I.U.'s per head of the working population. The transition between the units is effected on the following basis. Between 1913 and 1925–34 the cost of building rose 90 per cent in the U.S A., but of other capital goods only about 25 per cent, and a general average upwards movement of 60 per cent is assumed, thus making £1 in 1913 correspond to 7·8 international units.

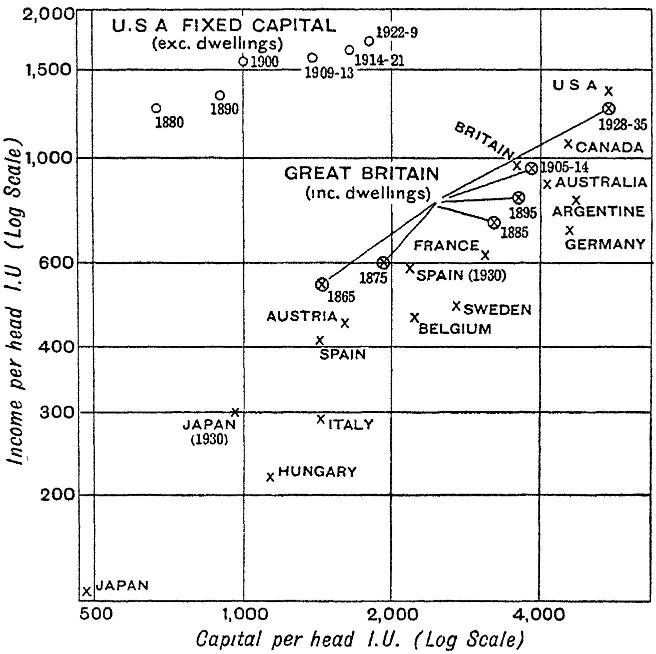
CAPITAL, EXCLUDING LAND AND NATIONAL DEBTS
(I.U. per Head of Working Population, 1913)

	Buildings	Railways	Farm Capital	Commercial Capital, i e Balance not included in previous Headings	Total	Real Income per Head of Working Population per 48-hour Week
U.S.A.	2480	760	360	1560	5160	1191
Canada	1780	655	525	1630	4590	1061
Australia	2270	435	430	965	4100	742
Argentine	1440	710	350	2180	4680	(800)
Germany	..	410	..	..	3130	704
France	1120	..	175	..	3060	629
Britain	1335	460	137	1658	3590	966
Italy	460	..	120	..	1430	328
Spain	485	..	160	..	1435	408
Spain, 1930 *	..	..	..	..	2150	600
Austria	410	295	..	..	1580	452
Hungary	310	215	..	..	1110	220
Sweden	880	170	190	1440	2680	474
Belgium	550	..	..	..	2190	470
Japan	160	51	..	..	460	128
Japan, 1930 †	360	57	..	..	980	301

* Based on Beckerath's estimate of national capital, *Weltwirtschaftliches Archiv*, July 1931.

† Assessment of national wealth in 1913 and 1930 at uniform prices made by Shiomi, *Kyoto Economic Review*, 1934

Comparison on the diagram of real incomes per worker for a 48-hour week with volume of capital per head gives a remarkably steep curve, unlike the curve of slope 0·3 approx. for the U.S.A. One must not, however, jump to the conclusion that the exponent of capital, considered interspatially, under the conditions of 1913, was necessarily very high. It must be remembered that no allowance has been made for the



differing proportions of different types of labour in the different countries, and if this were taken into account it would probably obviate a considerable part of the apparent slope. Data regarding the occupational structure of different countries are given in Chapter V above. They are not at present considered adequate for attempting a numerical investigation into this problem.

It must also be remembered that in many of the countries concerned scarcity of natural resources per

head of population was an important factor in keeping down real income. In other words, if countries like Spain, Austria and Japan had had no more capital than they actually did have, but had possessed natural resources per head of population equivalent to those of the U.S.A., their incomes per head would probably have been considerably higher.

The following data are also available for periods between 1880 and 1890, for which dates prices are assumed to have been not greatly different from the 1913 level.

CAPITAL IN I.U. PER HEAD OF OCCUPIED POPULATION

	Farm Capital	Railways	Buildings	Industrial Commercial Capital	Total
Denmark * .	313	61	626	740	1740
Sweden * .	77	58	199	166	500
Norway * .	70	20	280	340	710
Austria * .	..	..	205	..	1500
Hungary * .	..	..	97	..	335
Ireland † .	303	136	151	320	910

* Estimates by de Foville, *Dictionnaire des Finances*.
† Estimate by Giffen, *Economic Inquiries and Studies*.

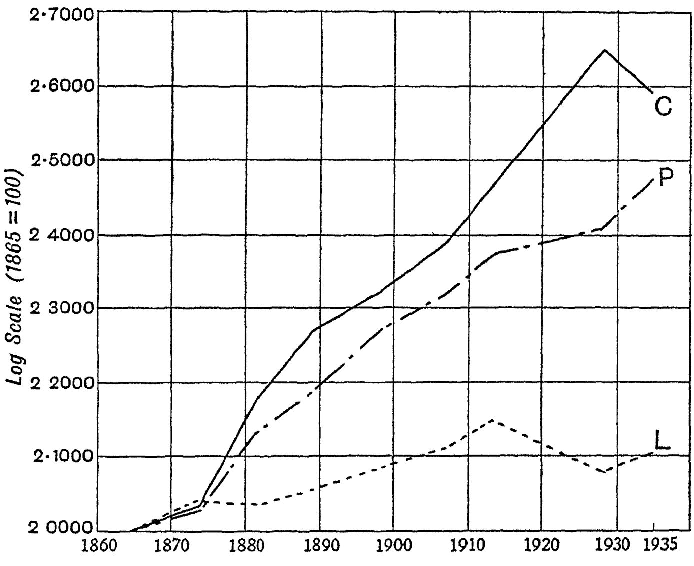
The figures for Great Britain on p. 392 are compiled from those quoted by Professor Douglas [1] reduced to a common standard of value and equated to international units in 1914. Figures for 1928 and 1935 are from Lord Stamp's *The National Capital*, revalued by use of an index figure of prices of capital goods and interest rates. It must be remembered that in this case also no allowance has been made for varying quality of labour.

Douglas (*loc. cit.*) gives capital at current money valuations, calculated on a uniform basis throughout the period, and excluding national debt, buildings and overseas investments. He excludes buildings on the grounds that these predominantly represented dwelling-houses, and that it is impossible to separate dwelling-houses from other buildings in the figures. Figures for 1928–35 are obtained from Stamp with the addition of 4 per cent for Southern Ireland.

[1] *Journal of Economic and Business History*, August 1930.

GREAT BRITAIN : I.U. PER HEAD OF OCCUPIED POPULATION

Years	Buildings, including Dwellings	Farm Capital	Rail-ways	Commercial Capital, i e Balance not included in Previous Headings	Total	Income
1865	565	338	225	292	1420	530
1875	612	288	282	768	1950	600
1885	991	269	480	1670	3210	720
1895	1250	197	515	1648	3610	810
1905	1386	155	480	1989	4010	900
1909	1418	150	465	1957	3990	930
1914	1326	135	457	1722	3640	970
1928–35	..	..	..	..	5350	1230



Figures are reduced to real terms by the method indicated. They are first multiplied by the rate of interest (yield of Consols) to allow for its effect on the price of capital assets. The product is interpolated (C) in order to fit the time periods for which income statistics are available and then further deflated by an index number (D) of price of capital goods. This is the average of the prices of iron and steel, and of building, collected in *National Income and Outlay*, p. 231. Figures of real national income per head per 48-hour week shown in the diagram are obtained from p. 83 above.

UNITED KINGDOM: GROWTH OF CAPITAL (REAL TERMS)

Year	A, Capital (Money) Value £m	B, Rate of Interest	A × B	Years	C	D (1913 = 100)	$\frac{C}{D}$	Index of Real Capital
1865	1,923	3 31	6,350	1860–69	6,350	112	6,220	100
1875	2,897	3 27	9,450	1870–76	8,789	129 5	6,780	109
1885	3,231	2 98	9,660	1877–85	9,576	112 5	9,330	150
1895	3,767	2 70	10,180	1886–93	9,894	85 3	11,600	187
1905	4,899	2 79	13,680	1894–1903	11,435	88 7	12,880	207
1909	5,189	2 95	15,300	1904–10	14,531	94 0	15,400	248
1914	5,529	3 31	18,500	1911–13	17,220	96 0	17,900	288
1928	9,435 +4% *	4 48	44,000	1914	18,500	100	18,500	297
1935	11,725 +4% *	2 89	35,200	1935	35,200	144	24,400	393

* To allow for the inclusion of Southern Ireland in the earlier figures.

The apparent decline in capital between 1928 and 1935 is surprising. The money figures of course show a big advance but after allowing for the effect of the change in interest rates a decline is shown. It is probably the case that by 1935 values of capital goods had not yet adjusted themselves to the strong changes in interest rates and replacement costs which had occurred during the years immediately preceding, and therefore the 1928 and 1935 figures are averaged to use as a general measure of post-war capitalisation

Indications of a decline in the real volume of capital over this period are, however, also obtained by Feaveryear [1] working by the quite different method of an analysis of death duty statistics. Making allowance for the changes in the ratio between the amount of capital passing by death in any one year and the total amount in existence, and deflating the figures by use of a specially weighted index number based on security prices and assumed values of real property, Mr. Feaveryear obtains the results shown in the table on p. 394 indicating a marked decline between 1929 and 1933. If we exclude the estimated value of land and buildings (Schedule A assessments) from the total we find evidence of an even more marked decline.

The figures of national income have been adjusted so as to exclude incomes from abroad and from rents. These two factors contributed the following proportion of national income at certain dates :

1867	9·3	1930	13·0
1911	15·7	1935	12·0

For intervening years the figures were interpolated.

[1] *Economic Journal*, June 1936.

Year	Estimated Total, £ million	Schedule A Assessments Gross, £ million per annum	Average No. of Years' Purchase *	Capital Value of Land and Buildings	Capital, excluding Land and Buildings
1925	15,012	..	..	..	..
1926	15,411	..	..	..	..
1927	15,779	..	..	..	..
1928	15,841	..	..	..	..
1929	15,965	416	11·4	4750	11,215
1930	15,924	424	11·3	4800	11,124
1931	15,930	431·9	11·2	4840	11,090
1932	15,612	444·4	11·1	4920	10,692
1933	15,282	450·7	11·0	4950	10,332

* Average number of years' purchase of real estate shown in Death Duty valuations.

When we examine the rate of growth in Great Britain, or the spatial comparison for 1913, we appear to get a much steeper slope in the diagram on p. 390, or a higher exponent than in the U.S.A., but as has been pointed out this is largely explained by two unmeasured factors, namely the improvement in the average quality of labour due to greater proportion of clerical and managerial workers, and possibly also (for the spatial comparison) to the comparative scarcity of natural resources per unit of labour in poorer countries. In other words the slope of the curve in the spatial comparison is indicative of the combined exponents of capital and of a natural resources factor.

Subject to these qualifications, a closer examination may be made of the results obtained from the diagram. The interspatial comparisons for 1913 and the historical comparisons for Great Britain are made on approximately the same basis. The historical series[1] for U.S.A. is based on Professor Douglas's more limited definition of capital, excluding dwelling-houses, working capital, and certain other assets. In all these figures land values are excluded from the totals of capital. A very distinct upward curvature is noticed in the British historical

[1] The 1913 income level in the U.S.A. is shown differently in the two series owing to the use in their computation of different conventions regarding the length of the normal working week.

series, a less distinct upward curvature in the U.S.A. series. These curvatures are probably indicative of a tendency towards increasing returns. The fact that from 1885 to 1928–35 the ratio

$$\frac{\textit{Increase of real income per head}}{\textit{Increase of real capital per head}}$$

was higher than between 1865 and 1885 is less likely to mean that the marginal productivity of capital had increased, than that increasing returns to the factors of production in general were being obtained.

As has been pointed out above, the factors of National Resources and Quality of Labour must not be neglected. Thus Great Britain in 1865 had about the same amount of real capital per head as Italy, Spain or Austria in 1913, but had a considerably higher average real income per head, owing to the operation of these two factors.

But taking these into account, we can say that in general the exponent of capital in the productivity function was probably about 0·35 for U.S.A. over the period 1880–1929, about 0·45 in Great Britain over the period 1865–1935, and probably higher in other countries.

Having summarised what little information is available regarding the aggregate stock of capital in different countries, we can now proceed to examine the data of the rate at which capital accumulation is taking place in different countries and times. Here the information is much more plentiful. Even where we only have approximate indications of the real value of the stock of capital already in existence, this information will enable us to judge the order of magnitude of the rate at which net addition to capital is taking place.

The first careful and detailed estimate of the rate of accumulation known to the writer was one prepared for the United Kingdom in 1863.[1] The estimated annual rate of accumulation was :

[1] Published in two articles in *The Economist*, 12th and 19th December, 1863.

	£ million
Dwelling-houses	40
Railways	10
All other investment . . .	80
	130

The author pointed out that this was a very conservative estimate and that the total was probably distinctly higher.

Baxter [1] gives an estimate that aggregate savings over the period 1855–65 were £1240 millions, or an average rate of £124 millions per year. The growth of population and income at this time was rapid, and it can certainly be assumed that the rate of saving was greater towards the end of the period.

Professor Douglas in his study of the growth of capital in the United Kingdom gives an average rate of increase of capital of £122 millions per year (at 1865 prices) between 1865 and 1875.[2] This, however, excludes houses, the aggregate value of which had increased between 1865 and 1875 from £1031 millions to £1420 millions according to Giffen's original table. Allowing for a 4 per cent rise in the price of capital goods over this decade (following Douglas), this gives an average rate of new building of £33 millions per year, as against £40 millions contemporarily estimated.

Altogether we may estimate a total rate of accumulation of £150 millions per annum in the 1860's.

For 1907 a careful estimate, based on the results of the First Census of Production, was made by Sir Alfred Flux, and published in the Report on that Census. For 1924 and subsequent years, figures are quoted from *National Income and Outlay* and from unpublished calculations by the author. " Public Works " investment for 1860–69 is the sum of railway and local authority borrowings.[3]

The ratio of savings to national income shows a downward trend. The ratio is always at its maximum at the peak of the trade cycle. Bearing in mind the fact that the decade 1860–69 comprehended an entire trade cycle, while 1907 and 1929 were both peak years,

[1] *The National Income*, published in 1868.

[2] His table in fact sets out to estimate savings in each individual year, but this is based on a rather tenuous assumption.

[3] Figures supplied by Dr. Cairncross, of Glasgow University, who has in manuscript extensive material on investment in Great Britain between 1860 and 1913.

National Income and Capital Accumulation in United Kingdom

Years	National Income, £ million including Indirect Taxation	Net Capital Accumulation, £ million (after providing for Depreciation)					Savings as per centage of National Income
		Dwellings	Public Works	Other Home Investment	Foreign Investment	Total	
1860–69	899	40	15	75	20	150	16·6
1907	1940	35	26	49	138	248	12·2
1924	4035	80	74	101	72	327	8·1
1929	4384	85	98	28	103	314	7·2
1932	3844	70	90	– 80	– 51	29	0·8
1935	4530	85	100	120	20	325	7·2
1937	5340	75	157*	163*	– 41	354*	6·7

* Private investment +£60 millions armaments financed out of loans.

the decline of the ratio is more rapid than appears at first sight. During the last trade cycle, net accumulation virtually disappeared at the low point of the trade cycle, and was only about 7 per cent. of the national income at the peaks.

For the U.S.A., the first period for which it is possible to make any accurate deductions about the rate of accumulation, is between the dates 1904–12. By comparing the aggregates of capital recorded at those dates, omitting land values, and allowing for price changes, Friday [1] was able to deduce an average annual rate of saving of $5400 millions per year, or 19·3 per cent of the national income. (The figures quoted in this and subsequent tables are of net national income exclusive of indirect taxes.)

National Income and Capital Accumulation in U.S.A.

Years	National Income, $ milliard	Net Savings, $ milliard	Per Cent Ratio	Year	National Income, $ milliard	Net Savings, $ milliard	Per Cent Ratio	Year	National Income, $ milliard	Net Savings, $ milliard	Per Cent Ratio
1904–12	28 0	5 4	19 3	1919	59 9	10 5	17 5	1928	80 4	8 2	10 2
				1920	72 4	11 6	16 0	1929	83 4	10 1	12 1
				1921	58 3	3 7	6 3	1930	72 9	3 9	5 3
				1922	59 7	5 8	9 7	1931	56 0	−0 3	0 5
				1923	69 7	9 7	13 9	1932	39 6	−4 4	−11 1
				1924	70 4	6 8	9 7	1933	39 3	−3 0	−7 6
				1925	74 8	10 6	14 2	1934	47 8	−1 9	−4 0
				1926	79 5	9 7	12 2	1935	53 0	0 8	1 5
				1927	77 4	8 9	11 5				

Friday, *loc. cit.* Kuznetz, *National Income and Capital Formation.*

[1] *American Economic Review*, Supplement, 1919.

If Friday's figures are valid (some obviously invalid estimates of savings which he makes for the period 1913–18 throw some doubt on them) it appears that the U.S.A. in the period 1904–12 was saving at an even greater rate than Britain at its maximum rate of saving in the 1860's. Dr. King[1] makes a lower estimate of 14 per cent for the ratio of savings to national income over the period 1909–14. But in U.S.A., as well as in Britain, the ratio of savings to national income, at any rate after the boom of 1919–20, shows a marked downward trend.

A general survey of savings in 1913 and in 1925–30 in six principal countries is made in *Kapitalbildung*,[2] by Marschak and Lederer, who use Dr. King's figure (quoted above) for American savings in 1909–14. For France they quote an estimate by Colson of 5 milliard francs per year average saving between 1899 and 1913. This is based on a comparison of evaluations of wealth in those two years. Pupin gives[3]

Year	Milliard francs			
	National Income	Capital	Savings	Savings less Losses and Liquidation
1903–11	33·6	193·6	..	3·5
1911	36·0	207·1	4·5	3·7

Net capital accumulation was thus only 10·2 per cent of national income, gross 12·5 per cent. In no other calculation so far has allowance been made for losses and liquidations, and the larger of the two above figures will be used.

De Foville (quoted by Neumann-Spallart) estimated French savings in the 1870's at 1·5 milliard francs, or 6 per cent of the national income. By the first decade of the present century the figure had risen, according to Levasseur (*Questions ouvrières*) to between 2 and 5 milliards, or 6 – 12 per cent of the national income.

For German savings over the period 1908–11 Marschak and Lederer quote Helfferich's estimate of 8-8½ milliard marks per year; and they make rough estimates for the annual rate of saving in

[1] *Journal of American Statistical Association*, 1922–23.
[2] Published in London in 1936, Wm. Hodge and Company.
[3] *La Richesse française avant la Guerre.*

Holland (370 million guelders in 1912) and Switzerland (329 million francs average per year 1900–1910). These represent respectively 19·1 per cent, 12·8 per cent and 10 per cent of the national incomes of those dates.

Other pre-war information relates to Norway, where savings were 15 per cent of the national income in 1913,[1] and Canada, where the Coats Report of 1915 gives the following figures for investment in the decade 1900 to 1910:

	$ million in 10 Years
Farm buildings	150
Farm implements	125
Farm livestock	150
Fishing	10
Mining	30
Manufacture	390
Railways	750
Canals and public works	100
Buildings other than factories	750
	2455

Average national income over this period was about $1750 millions. Direct comparison cannot be made as a substantial amount of this investment was provided by capital imports

An interesting series for Russia is available from Prokopovitch.[2] In the course of a survey of the development of Russian national income from 1900 to 1930 he gives the figures:

Year		Net Savings, milliard roubles	Net Savings, milliard roubles at 1913 Prices	Per Cent of National Income
1890–1900	Pre-war territory	0·3	..	3·3
1900–1913	Pre-war territory	1·0	..	8·2
1913	Pre-war territory	1·5	..	9·0
1925–26		3·80	2·53	19·2
1926–27		3·86	2·58	18·3
1927–28		4·33	2·76	18·2
1928–29		5·71	3·70	22·2
1929–30		9·92	6·17	31·2

From *Critique of Russian Statistics* the following figures are

[1] Wedervang, *Weltwirtschaftliches Archiv,* January 1931.

[2] Published in Birmingham University Bulletins on Russian Economic Conditions.

obtained. In this case all Russian values have been re-expressed in sterling of 1934 purchasing power.

Years	National Income, £ million	Investment £ million		Net Investment as Percentage of National Income	Stock of Capital, £ million (Non-agricultural)
		Gross (before Deduction of Depreciation)	Net		
1913	2803	..	..	..	..
1927–28	2840	305	222	7·8	1400
1934	3454	738	491 *	14·2	3140

* Identifiable items in this total are Transport, £123 millions, Housing, £84 millions; Agriculture, £69 millions Most of the remainder was in manufacturing industry

When both capital goods and national income are re-expressed in sterling values, as in this latter calculation, a truer picture is obtained than that shown by the Russian figures direct: for in the latter an abnormally high price was placed on capital goods and the share of the national income which they represent artificially inflated. As the total real national income in 1927–28 was below that of 1913, and income per head distinctly lower, it seems *a priori* more probable that the ratio of savings to national income in 1927–28 was somewhat below the 1913 level, and not far above as indicated by the Russian figures: at any rate at that date, when standards of consumption of certain sections of the community had been allowed to rise above 1913 level, and before the inauguration of the First Five-Year Plan.

The very high figures quoted by Prokopovitch for 1929–30 were based on planned figures of output, as currently published, and were not realised.

An estimate of Hungarian savings was made for 1907 by de Fellner[1] of 185 million kronen National income at that date, including services and on a comparable basis with the other figures, was 3960 million kronen, giving a ratio of 4·7 per cent.

Von Beckerath[2] estimated that Spain saved 3 milliard pesetas out of a national income of 25–30 milliards in 1930, and 0·7 milliard only in 1913. National income at that date, as given by Vandellos, was 10·75 milliards The ratio of savings to national income rose from 6·5 per cent in 1913 to 10·9 per cent in 1930.

We have some figures for Japan[3] for 1919–36 which may be examined in conjunction with Shiomi's[4] estimates of the growth of

[1] International Institute of Statistics, 1907 conference.
[2] *Weltwirtschaftliches Archiv*, July 1931.
[3] *Mitsubishi Bureau Circular*, April 1937.
[4] *Kyoto Economic Review*, 1934.

real capital between 1913 and 1930. The Mitsubishi figures show savings as 21·9 per cent of the national income in 1919 and 19 8 per cent in 1928, falling to 7 9 per cent in 1931, and rising to 21·9 per cent again in 1936. Figures unfortunately are not given for the intervening years between 1919 and 1928.

The absolute amounts of savings are put at 2 46 milliard yen in 1928, falling rapidly to 0·72 milliard in 1930; and 2·33 milliards in 1919. Shiomi's figures show a real capital, excluding land values, of 69·1 milliard yen in 1930, and 28·3 milliard yen in 1913 at 1930 prices; an average rate of accumulation of 2·4 milliard yen per year at 1930 prices over the seventeen years. This confirms the Mitsubishi figure.

For post-war years the Marschak-Lederer figures are used for France, Holland and Switzerland. For France in 1927–30 net accumulation was put at 25·9 milliard francs, or 11·2 per cent of national income. For Switzerland in 1926–30 net accumulation was 1·25 milliard francs out of a national income of 9·90 milliard francs (10·4 milliard francs given by Marschak and Lederer). For Holland in 1925–30 the figure is 1045 million guelders, or 19 per cent of the national income of 5500 million guelders.

Fuller figures for Germany can be taken from another article by Dr. Marschak (*Archiv für Sozialwissenschaft*, 1932), from a "balance-sheet" of all production and consumption in 1928 published in *Einzelhandel in das Deutsche Reich*, annual estimates of investment, the balance of payments, and national income published in Statistisches Jahrbuch, and some up-to-date figures published by Institut für Konjunkturforschung (26th January 1938). Over some of the period investment and consumption statistics can be obtained independently to check against national income.

The "balance" for 1928, which is reproduced in detail because of certain unusual features in the German situation, is as follows:

[TABLE

	Milliard Marks, 1928		Milliard Marks, 1928	
Net National Income	75·4	Net investment in fixed capital	7·3	
Goods produced for replacement and depreciation	6·7	Net addition to stocks	2·7	16·7
		Replacement and depreciation	6·7	
		Reparation payments	2·0	2·9
		Net imports of gold	0·9	
		Consumption:		
		Retail Sales	36·3	
		Handicrafts	9·4	
		Self-supply by agriculturists	3·6	66·0
		Rents	7·4	
Net borrowing from abroad	4·1	Services	9·3	
		Interest due abroad		0·6
	86·2			86·2

The "balance of payments" in the ordinary sense of the words being:

	Milliard Marks, 1928		Milliard Marks, 1928
Exports:		Imports:	
Goods	12·7	Goods	13·9
Services	1·6	Services	1·0
		Reparations	2·0
		Gold imports	0·9
Net borrowing	4·1	Interest due abroad	0·6
	18·4		18·4

It is correct in this case to include both reparation payments and gold imports with investment, on the grounds that they both represent part of the produced national income which was not consumed. Interest due abroad is not so regarded, as this is held to represent a necessary cost in producing the national income, which would prob-

ably have been lower if the foreign capital had not been in use. Net borrowing is deducted from the total of investment. On this basis, true net investment in 1928 was 8·8 milliards out of a net national income of 75·4 milliards, or 11·7 per cent.

For the period 1925–31 we have Dr. Marschak's estimates of consumption, which check up very closely with national income data. The results are :

	Milliard Marks						
	1925	1926	1927	1928	1929	1930	1931
Income Data							
Net National income	60·0	62·7	70·8	75·4	75·9	70·2	57·5
Depreciation and replacement	5·6	5·9	6·4	6·7	6·9	6·9	6·4
Net borrowing	3·4	0·7	4·3	4·1	2·2	0·6	+ 2·3*
	69·0	69·3	81·5	86·2	85·0	77·7	61·6
Investment and Consumption Data							
Investment :							
Fixed capital	4·7	4·8	6·5	7·0	5·8	3·5	0·1
Stocks	2·7	− 2·0	4·4	2·6	− 1·3	− 3·8	− 5 1
Depreciation	5·6	5·9	6·4	6·7	6·9	6·9	6·4
	13·0	8·7	17·3	16·3	11·4	6·6	1·4
Reparations	1·1	1·2	1·6	2·0	2·4	1·8	1·0
Net gold imports	0·5	0·6	0·1	0·9	− 0·4	..	− 1·2
	1·6	1·8	1·7	2·9	2·0	1·8	− 0·2
Consumption (Marschak)	52·5	55·5	61·8	66·4	67·0	62·6	55·4
TOTAL	67·1	66·0	80·8	85·6	80·4	71·0	56·6
Net investment (including reparations and gold imports)	5·6	3·9	8·3	8·8	4·3	0·9	− 2·9
Per cent of net income	9·3	6·2	11·9	11·7	5·7	1·3	− 5·0

* Net repayment

The ratio of savings to national income reached a temporary maximum in 1927 and 1928, and in the other years was much lower. Dr. Marschak's figures of consumption check very closely over the

period 1925 to 1928, but for 1928–31 he seems to have exaggerated the fall.

From 1932 onwards the investment data must be compared direct with national income figures.

	Current Prices (milliard reichmarks)						
	1932	1933	1934	1935	1936	1937	1938
National Income .	45·2	46·6	52·7	58·6	64·9	71·0	76·0
Gross fixed investment . .	4·2	5·1	8·3	11·2	13·8	16·0	18·5
Net fixed investment . .	− 1·6	− 0·7	2·5	5·2	7·6	9·5	11·7
Stocks . . .	− 1·9	0·6	1·3	..	0·5	1·2	..
Gold imports .	.	− 0·3	− 0·4	..	..	..	..
Net borrowing from abroad . .	+ 0·4*	+ 0·6*	0·1	0·1	+ 0·4*	+ 0·5*	0·2
TOTAL net investment . .	− 3·1	+ 0·2	+ 3·3	5·1	8·5	11·2	11·5
Per cent of national income . .	− 6·9	0·4	6·3	8·7	13·1	15·8	15·2

* Net repayment.

Recent data from *I.F.K.*, 26th January 1939.

Savings appear to have risen to a rather higher percentage of national income than they were in 1927 and 1928, though still below the pre-war ratio.

An estimate [1] for savings in the former Austrian republic in 1927–28 gave 850 million schillings out of a national income of 7500 million schillings approximately, or 7·3 per cent.

Figures for New Zealand from the unpublished memorandum previously quoted.

For Sweden data are available from *National Income in Sweden*. Unfortunately adequate data for building and construction, which makes up about 75 per cent of the total of net investment, are not available before 1896.

Detailed figures for Australia for the years 1928–29 to 1937–38 are given by Dr. Roland Wilson, Commonwealth Statistician, in a paper read at the Australian and New Zealand Association for the Advancement of Science Meeting in January, 1939. Dr. Wilson's tables

[1] Gross, *Weltwirtschaftliches Archiv*, July 1931.

include motor cars, furniture and other durable consumption goods. Separating these out so as to accord with the definition of investment used elsewhere (including dwelling-houses but no other durable consumption goods) we can re-state Dr. Wilson's results as

INVESTMENT IN SWEDEN
(Million Kroner)

Year	National Income	Plant and Equipment										Net Internal Investment	Balance of Payments	Net Saving	Net Saving as per Cent of National Income
		Agricultural Equipment (including Forestry and Fishing)		Manufacturing and Mining and Handicraft Equipment		Transport and Communication Equipment		Commerce, Public Service and all Other Industries		Buildings (including Farming and Factories) and Construction					
		Gr.	Net	Gr	Net	Gr.	Net	Gr.	Net	Gr	Net				
1861–69	680	3	1	5	1	6	5	1	.		.	..	−15	.	..
1870–76	1005	6	2	20	12	12	10	2			.	.	−19	.	
1877–85	1095	7	1	20	2	8	4	2	.		.	..	−51	.	.
1886–93	1185	8	1	23	2	12	6	3			.	..	−45	.	
1894–03*†	1664	14	4	35	8	35	23	8	4	193	136	175	−41	134	8 1
1904–10	2406	28	9	54	10	55	35	15	8	295	211	273	−79	194	8 1
1911–13	3034	39	10	66	13	65	39	19	11	360	259	332	+33	365	12 1
1913	3230	45	14	84	28	72	44	23	14	395	290	390	+33	423	13 1
1925–30	7360	110	15	190	36	190	124	62	35	856	615	825	+149	974	13 5

* 1896–1903 for building figures.
† "Alternative I" (i e. excluding building) up to 1893 From 1896 "Alternative II" less imputed income from durable consumption goods other than houses

on table facing p. 406 (omitting the figures for net changes in working capital, which are uncertain and in any case small, and including net increments and decrements of livestock with farm equipment).

Comparing the peaks of the two trade cycles, the trend of Australian savings, as a fraction of the national income, appears to be upwards. Total net internal investment however was 15 per cent of produced national income in 1928–29 and only 12-13 per cent in the last

two years. The discrepancy of course is explained by the fall in net capital in-flow from other countries.

The predominance of buildings and public works in the total of investment is very marked. About $\frac{2}{3}$ of the total shown under buildings represents dwelling-houses.

The table below summarises all the information regarding the proportion of national income saved in different countries and at different dates.

SUMMARY OF DATA RELATING TO PROPORTIONS OF NATIONAL INCOMES SAVED

Upper line: Income per head of working population on 48-hour week basis, I.U.
Lower line: Percentage saved.

	1860–69	1870–79	1890–1900	1900–10	1913	1919–24	1925–30	1934–37
Great Britain	532			926		1117 *	1208	1323
„	16 6			12 2		8 1	7 6	7 0
U.S.A.				1325		1499	1672	2013
„				14 3		12 2	10 9	5 0
France		410		630	629		681	
„		6 0		9 0	12 5		11 2	
Germany				670			722	864
„				19 1			7 7	11 8
Norway					420			
„					15 0			
Switzerland				585			1036	
„				10 0			12 6	
Holland					807		985	
„					12 8		19 0	
Russia			300	330	342		325	358
„			3 3	8 2	9 0		7 8	14 2
Spain					510		628	
„					6 5		10 9	
Japan						195	312	362
„						21 9	19 8	21 9
Australia							1108 †	1361
„							7 2	9 1
New Zealand							1305	1740
„							11 5	10 5
Austria							650	
„							7·3	

* 1924. † 1928–30.

The first conclusion to be drawn from it (and this is important) is that the proportion of income saved does not inevitably rise as income increases. In Britain, Germany and U.S.A. indeed the trend has been strongly downwards: the German ratio, it will be noticed, in spite of strenuous efforts, remains well below the 1900–1910 level. In Australia, Holland and Switzerland the

proportion of savings to national income has risen, and in Japan has been constant, with rising income. In Russia the 1913 ratio of savings to income, like the 1913 level of real income per head, has only recently been regained.

Professor Douglas indicated that it should be possible to test his formula and the derivations from it by examining the share of the value of output which actually did accrue to the factors of production. For, if

$$P = b\,L^{k}\,C^{1-k},$$

then the aggregate reward of capital will be

$$C\frac{\partial P}{\partial C}$$

and its share of total product

$$\frac{C\frac{\partial P}{\partial C}}{P} = 1 - k.$$

Professor Douglas shows that in manufacturing industry, during the period to which he refers, the share obtained by capital did not differ greatly from its exponent. Between 1909 and 1918, the only years for which full figures were available, it was indeed 26 per cent.

In New Zealand, Dr. Max Brown found that the share of capital in the net output of manufacturing industries, over the eleven years (1924–25 to 1934–35) for which data were available, was absolutely identical with the exponent in the productivity formula (0·517). Though it is high, the amount of capital per unit of output is low compared with U.S.A. and Great Britain. The value of P/C is 0·46, and hence the marginal rate of return on capital $\left[(1-k)\frac{P}{C}\right]$ in manufacturing industry (including depreciation) should be 24 per cent.

The present-day distribution of income between factors of production has been determined for U.S.A. in

more detail, and more systematically than for any other country.[1]

Year	National Income, $ milliard	Percentage Distribution		
		Compensation of Employees	Entrepreneurial * Withdrawals	Rent Interest and Profits
1919	64·20	61·1	15·0	23·9
1920	70·78	65·5	15·7	18·8
1921	57·68	64·8	13·9	21·3
1922	58·70	67·9	13·2	18·9
1923	68·28	67·3	12·1	20·5
1924	68·90	67·1	12·3	20·6
1925	73·27	65·9	11·7	22·4
1926	77·60	65·7	11·0	23·3
1927	75·41	68·0	11·3	20·7
1928	78·63	67·2	10·8	22·0
1929	81·92	68·3	10·6	21·1
1930	71·97	71·1	11·0	17·9
1931	56·71	77·3	11·5	11·2
1932	41·03	85 0	12·9	2·1
1933	39·49	85·4	12·8	1·8
1934	47·64	77·8	11·5	10·7
1935	53·37	75·6	11·2	13·2
1935 †	53·75	70·5	11·2	18·3
1936	61·00	69·5	10·8	19·7
1937	67·95	70·8	10·5	18·7

* Incomes of " entrepreneurs " in professions and other service industries are included with " compensation of employees ".

† Department of Commerce figures, *Survey of Current Business*, June 1938. Relief work excluded. Entrepreneurial withdrawals in service and miscellaneous industries assumed to have been as given by Kuznetz in 1935 and since then to have risen proportionately to entrepreneurial withdrawals as a whole.

An estimate back to 1900 has been made by the Brookings Institute.[2] Including in national income rental value of houses, excluding interest and dividends from overseas, and imputed income from durable consumption goods other than houses, we have :

[1] Kuznetz, *National Income and Capital Formation*, Table VI. National income quoted above is defined exclusive of " Net Savings of Government " and also of " Relief Work Wages " ($619 millions in 1933, $1389 millons in 1934, $1313 millions in 1935). [2] *America's Capacity to Consume*, pp. 152-7.

Year	National Income, $ milliard	Percentage Distribution		
		Employees	Individual Enterprises	Rent Interest and Profits
1900	18·6	51·3	48·7	
1909	30·13	50·0	24·1	25·9
1910	31·72	51·3	22·9	25·8
1911	31·67	52·0	22·8	25·2
1912	34·29	51·2	23·2	25·6
1913	36·14	52·2	21·9	25·9
1914	34·93	53·1	23·1	23·8
1915	38·20	50·7	22 2	27·1
1916	46·93	47·9	22·3	29·8
1917	54·50	47·4	25·6	27·0
1918	60·11	53·8	25·9	20 3
1919	67·56	52·4	25·2	22·4
1920	71·69	58·9	21·4	19·7
1921	57·68	62·8	19·5	17·7
1922	64·70	58·2	18·7	23 1
1923	73·75	58·1	19·2	22·7
1924	75·29	59 0	19·6	21·4
1925	81·35	57·6	19·6	22·8
1926	82·76	59·5	17·9	22·6
1927	82·60	60 2	18 4	21·4
1928	85·53	59·2	17·6	23·2
1929	88·02	60·6	16·1	23 3

This study is based on a different and wider definition of national income, and on rather less complete information. Professional and similar incomes have not in this case been included with the incomes of employees : and the imputed value of owner-occupied houses has been included. Over the period 1919–29 the two investigations show similar results for the share of national income accruing to capital. During this period the value of P/C, for national income as a whole, appears[1] to have been 0·335. The share of capital in the national income, as shown above, is 21·2 per cent, but this is too low, as some part of the income shown as accruing to individual

[1] Comparing national income at 1929 prices, as given by Dr. Kuznetz, with his figures of aggregate capital at 1929 prices in 1919 and 1929 (see note on page 386 above).

enterprises represents remuneration of capital. Direct determination of $(1-k)$, from the slope of the line relating $\log\frac{P}{L}$ to $\log\frac{C}{L}$ in the diagram on p. 390, gave a result of 0·35, and probably we may take $(1-k)$ at about 0·3. For this period the formula for the marginal productivity of capital $\left[(1-k)\frac{P}{C}\right]$ gives us a result of 10·0 per cent.

The share of capital has recently shown a tendency to decline. This decline has been intensified during the last decade. The years 1932 and 1937 marked the trough and peak of a trade cycle; for the average of these six years, the share of capital and enterprise combined amounted to only 22·5 per cent of the national income, of which 11·6 per cent represented the share of enterprise. Whether this represents a permanent decline in the exponent of capital, or is a consequence of the fact that even at the peak of this trade cycle nothing like normal full employment was reached, remains to be seen.

The following analysis (based on slightly different definitions) given by Dr. Kuznetz shows the relative distribution of income in the different types of industry averaged over the period 1919–34:

	Compensation of Employees	Entrepreneurial Income Payments	Property Income Payments
Agriculture	16·3	77·7	6·0
Mining	84·1	1·4	14·5
Manufacturing	83·9	2·3	13·7
Construction	80·6	17·1	2·3
Transport and Public Utilities	72·9	0·1	27·0
Trade	71·2	24·1	4·8
Finance	31·6	42·3	26·1
Government	77·5	.	22·5
Service	98·4		1·6
Miscellaneous	90·7		9·3
TOTAL	69·8	17·0	13·2

This throws into predominating importance the three types of industry in which capital may still be said to have "value". The figure of 27 per cent as the long-term share of property in the output of transport and public utilities is a weighted average of the following shares :

	Share of Property Per Cent
Electricity and gas supply	57·2
Steam railways	21·3
Street railways, pipe lines, water transport	19·4
Telephone and telegraph	22·8

While the figure for finance is compounded of 36·6 per cent in banking, −4·3 per cent in insurance, and 30·2 per cent in "real estate" (including the ownership of leased houses and flats).

In the sphere of government, capital must be presumed to have value, in so far as interest is being paid on public debts freely incurred by the community for the provision of public services. About half of the share of interest in the total cost of government, as shown above, represents, however, interest on the Federal war debt.

In general, the conclusion must be reached that the highest marginal return to capital, under present-day conditions, is probably to be found in investment in public utilities, housing and banking ; and it is to be anticipated that the main flow of capital in the future will be into investments of the two former types. (High profits in banking are probably to be regarded as temporary : at any rate, the idea of any substantial flow of new capital into banking must be regarded as absurd.) The amount of capital absorbed by new investments in manufacture and mining will be small, and in the other types of industry, smaller still.

For Great Britain the following analysis of the distribution of home-produced private incomes can be made.[1] The wage figures include an allowance of £75

[1] *National Income and Outlay*, pp. 94, 125.

per head for wage equivalent of entrepreneurs and independent workers in 1911 and £150 per head for the post-war years (the pre-war figures included a large proportion of small farmers in Ireland). We obtain the following ratios of wages and salaries to total national income :

RATIOS OF WAGES AND SALARIES TO TOTAL NATIONAL INCOME

	Per Cent		Per Cent
1911	66·6	1930	74·3
1924	77·4	1931	80·0
1925	73·2	1932	80·4
1926	75·5	1933	79·3
1927	76·4	1934	76·6
1928	77·3	1935	73·5
1929	76·9		

The figures indicate that the exponent of capital in the production formula in Great Britain must now be distinctly lower than the figure of 0·45 calculated from the capital data. The post-war figures for the share of rent interest and profits are much below the 1911 level, but at the same time there appears to have been no further downward trend between 1924 and 1935. Professor Bowley has shown that between 1880 and 1913 the share of wages and salaries in home-produced national income remained almost constant at 69 per cent.

The comparison by industries shows the following figures for the percentage shares of rent profit and interest :

	1911	1930
Manufacture,* Mining and Building	34·6	33·4
Railways	52·2	24·8
Agriculture	53 9	50·1
Ownership of houses	100 0	100·0
Other transport, distribution and services	44·7	23·8
TOTAL	45·0	33·5

* Including gas, water and electricity supply.

The situation here revealed is curious. There has been a great fall in the share of capital in railway income

and in distribution and services. In the latter case the share lost by capital has been taken by salaries. The figures for agriculture are in striking contrast to those of the U.S.A. The figures quoted above include farmers' incomes, though even after their exclusion the share of rent in the net output of English agriculture is considerable.[1]

Detailed calculations of pure urban rents (i.e. excluding all interest and maintenance on the capital value of buildings) have been calculated by Dr. H. W. Singer (unpublished). For England and Wales they rise from £8·3 millions, or 1·6 per cent of the national income in 1845, to a maximum percentage of 3·3 per cent of the national income in 1888, falling to 3·2 per cent of the national income in 1931.

For France, analyses of national income by factor distribution are available for 1891 [2] and 1911.[3] In each case, allowing the current average of agricultural wages as the labour income of peasants and of industrial wages as the labour income of other independent entrepreneurs, the share of capital and land in the national income amounted to 34 per cent.

Analysis by another method can be made from figures quoted by Leroy-Beaulieu,[4] Simiand [5] and

[1] In this respect a careful analysis of English agricultural net income in 1860 by Purdy (*J.R.S.S.*, 1861, p. 325) is of interest:

	£ milliard
Wages	40
Farmers' income . . .	26·5
Gross rents (i e. without deduction for repairs or taxes)	50·5
	117

Rents thus took 43 per cent of the whole net output — apparently a higher proportion even than they had taken in 1838, at which date McCulloch estimated agricultural net output for Great Britain at £143 millions. Since 1860 there has been only a slight fall in the relative share of net output taken by gross rent, which remains at between 35 and 40 per cent.

[2] Coste, *Journal de la Société de Statistique de Paris*, 1891.

[3] Pupin, *La Richesse privée française avant la Guerre.*

[4] *La Repartition des richesses.* [5] *Le Salaire*, vol. iii. pp. 95, 97.

Dugé de Bernonville [1] of property incomes, and from national income figures quoted in Chapter IV above.

Years	Milliard francs					
	National Income	Rural Rental Values (Leroy-Beaulieu and Simiand)	Urban Rental Values		Income from *Valeurs Mobiliers* (Simiand)	
			Simiand	De Bernonville	Home	Foreign
1790	2·5	1·2	.	.	.	.
1815	6 0	1·5	..	..	..	.
1851–53	12·5	1·9	0·74	..	0·42	0·18
1869–70	25·0	2·8	..	.	1·14	0·60
1879–81	25·3	2·6	.	.	1·83	0·60
1888–92	26·3	2·38	2·09	..	2·03	0 76
1899–1900	30·0	2·08	2·34	..	2 06	1·04
1908–13	36 0	2·08	2·70	2·6	3·08	2·10
1924	155·0	10 0	5·82	7 0	19·0	5·0

Computed in this way, the share of capital and land in the national income amounted to 27·5 per cent about 1890 and almost exactly the same about 1911. It will be remembered that the previous calculation, quoted above, showing 34 per cent in both years, was based on a minimal estimate of entrepreneurial incomes, which were taken only as equal to agricultural and urban wages respectively, and the true figure lies somewhere between 27·5 per cent and 34 per cent for both years.

Omitting income from foreign investments from the national income, we find the following shares of national income going to land and capital :

	Per Cent		Per Cent
1850	24·7	1911	26·0
1890	25·5	1924	23·6
1900	22·4		

—a fairly constant share. The figures for rent and national income in 1790 need not be accepted, but it does appear

[1] *Revue d'Économie Politique*, May–June 1935.

that the share of rent in the national income was very high at that date. For over a century it has been steadily falling. Now it probably barely represents interest on the capital invested in improvements to the land, and true agricultural rent is non-existent.

In French manufacturing industry, on the other hand, the Census of 1930 showed that wages and salaries obtained only 57 per cent of the net product. In France, unlike America, the marginal return to capital engaged in manufacturing appears to be high, and in the long run a further flow of capital into French industry is to be anticipated.

A fairly complete analysis of the factor distribution of national income in Japan can be made over the period 1919–36. A large fraction of the national income in this country represents the income of peasants, which must be divided between labour income and property income for the purposes of classification. A complete evaluation of annual rents from land in Japan in 1930 was made by Shiomi,[1] who gives :

	Milliard Yen per Annum
Paddy fields . .	838
Other fields	216
Building land . .	629
Forests, meadows, etc. .	52
	1735

The Mitsubishi Economic Research Bureau has published figures of wages and national income [2] and of the incomes earned in agriculture and forestry.[3] Neglecting the small overlap due to the existence of wage-labour in agriculture, and assuming that 1930 land values prevailed throughout the period, we can compute net labour-income earned in agriculture.

[1] *Kyoto Economic Review*, 1931, p. 55.
[2] Circular, April 1937.
[3] Circular, March 1934.

Year	National Income	(Milliard Yen)		Percentage of National Income	
		Wages	Agricultural and Forestry Incomes less Rents	Wages	Agricultural Labour Income
1919	10·66	3·49	2·84	32·7	26·6
1925	11·90	6 0 approx.	2·31	50·0 approx.	19·4
1931	10·04	4 91	0 15	49·0	1·4
1934	12 03	5·71	0·42	47·5	3·5
1936	13 11	6·23	..	47·5	.

The assumption of constant land values is clearly invalid since the slump of 1930. But even if we assume that land values have disappeared, and that all net income from agriculture and forestry represents labour income — clearly an extreme assumption — this was still only 12 per cent of the national income in 1934. It appears that the share of labour in the Japanese national income has been declining since 1925.

These analyses of the productivity of capital in various uses and in various countries should, if correct, throw some light on the problems of the composition of capital: that is to say, the relative proportions of the different types of investment to be found in the existing stock of capital, so far as it can be measured, in different countries and at different dates, and in the flow of new capital.

Lord Stamp's figures of capital in the principal countries in 1913, and the British series from 1865 onwards, can be analysed into buildings, railways, farm capital and other commercial capital.

The various figures for the U.S.A. are, unfortunately, defective and inconsistent, and it is impossible to obtain full figures for any other years, or in any more detail, than the analysis given above based on Lord Stamp's work: except to indicate that of the figure of 1560 I.U. per head of occupied population representing industrial and commercial capital, about 485 units at that date

represented investments in public utilities other than railways. As will be shown later, this type of investment has become of steadily increasing importance.

Combining the temporal data for Great Britain with the spatial comparison between different countries in 1913, we find in each case approximately the same laws of growth of capital:

Total Capital Investment (I U per Head of Working Population)	Farm Capital	Railways	Buildings	Industrial and Commercial Capital
About 500 (Japan, 1913) (Sweden, Norway, Hungary, 1880) . . .	100	50	100–200	100–300
1000–2000 (Great Britain, 1865, 1875) (Ireland, Austria, Denmark, 1880) (Austria, Hungary, Italy, Spain, 1913) . . .	100–300	200–300	200–600	300–800
About 3000 (Great Britain, 1885, 1900, 1913) (Germany France, Sweden, 1913)	300–400	200–500	900–1300	1200–1600
4000–5000 (U.S.A., Canada, Australia, Argentine, 1913)	300–500	400–700	1400–2400	1600–2000

The accumulation of farm capital naturally constitutes the first stage of capital accumulation, but from a comparatively early stage it will only represent a small fraction of each new increment of capital. The building of railways absorbs a substantial but not predominant share of the total increment of capital in the first stage, subsequently absorbing only a small share. The most interesting portion of the table, however, is that illustrating the relative rates of growth of industrial and commercial capital on the one hand, of buildings on the other. Up to the stage of about 3000 I.U. of capital per head (the stage reached by the principal European countries about 1913) industrial and commercial purposes absorb the main proportion of capital accumulation, taking 800 or 900 units out of the 1500 units per head increase of capital between the preceding stage and this one. From here onwards, however, the rate of growth

of industrial and commercial capital begins to slow down, and buildings absorb the lion's share at the next stage of increase.

These tendencies may be studied in more detail by examining the composition of the present flow of new investment in each year, in comparison, where possible, with other years. The longest series of data are those referring to Great Britain, and here some remarkable tendencies are apparent (see table on page 397 above).

With a slowing down in the rate of population growth, the portion of national income devoted each year to the construction of new dwellings has fallen from 4½ to 2 per cent, and may be expected to fall further. This, however, by no means fully accounts for the reduced share of savings in the national income. Industrial and commercial investment, which absorbed 8·3 per cent of the national income in 1860–69, took only 2·5 per cent in 1907 and less than 1 per cent in 1929, while during 1932 rapid decumulation was taking place in this sphere (largely decumulation of working capital).

At the same time investment in public works, as compared with other investments, shows an upward tendency. These figures show how marked is the contrast between the "young" economic organism of the 1860's where manufacturing capital is being rapidly accumulated and at the same time a considerable fraction of the national income has to be saved each year to provide houses for a rapidly growing population, and the "mature" form of economy. In comparison with the earlier data, Britain was already mature by 1907, though becoming still more mature at the present time. Opportunities for new industrial investment are very much reduced, and indeed net industrial investment may disappear altogether (replacement of depreciated capital sufficing to maintain the rate of technical progress). Whether or not investment in housing will be active depends on a number of other factors. But the inescapable tendency is for an increasing proportion of savings to be devoted to investments of the "public works"

type, where interest returns are low, but where the scope for investment of new capital is almost limitless. Capital as a factor of production obtains, as we have seen, diminishing returns; that is to say, the rate of interest must fall as the average stock of capital per worker rises. And the transfer of new investment from profitable manufacturing ventures to less remunerative public investments is an inevitable part of the mechanism.

For the U.S.A. figures are only available since 1919.[1]

NET CAPITAL FORMATION (EXCLUDING CHANGES IN INVENTORIES AND IN STOCKS OF GOLD AND SILVER)

Year	($ million at 1929 Prices)				
	Dwellings	Business	Public	Foreign	Total
1919	-336	1677	1042	2072	4455
1920	-892	1503	881	1342	2834
1921	345	18	1314	1381	3058
1922	1878	1010	1588	507	4983
1923	2273	2312	1242	270	6097
1924	2544	2337	1572	695	7148
1925	3079	3282	1868	292	8521
1926	2518	3415	1792	139	7864
1927	2182	3903	2090	495	8670
1928	1854	3656	2287	707	8504
1929	530	4338	2326	457	7651
1930	-646	2591	2489	721	5155
1931	-984	-458	2220	547	1083
1932	-1867	-2600	1744	113	-2610
1933	-1899	-2370	1500	253	-2516
1934	-1839	-1347	2195	-400	-1391
1935	-1209	-531	2175	-827	-392

The net decumulation of dwelling-house capital in 1919–20 and 1930–35 is very remarkable, as also is the decumulation of business capital from 1931 to 1935. The heading "Public Investment" refers to all works and buildings constructed by public authorities, including schools, hospitals and roads.

It will be noticed that even in the period of greatest

[1] From *National Income and Capital Formation.*

activity in 1923–29, business investment only took 40–50 per cent of America's net savings each year, and business has subsequently decumulated several years' accumulations. Public investment indeed has been the only form of net investment during the last few years, and there is every sign of this predominance persisting. For 1937 the figure for net investment[1] in dwellings in the U.S.A. had risen by $770 million above the 1935 level, and in business plant and equipment by $3126 millions above the 1935 level. There was also a violent but temporary rise in inventories. But in 1938 business investment fell back to the extent of some $2000 millions. Investment in dwellings was about maintained at the 1937 level (by strong Government support).

For Germany an analysis of net investment in fixed capital is available from 1924 to 1934 (*Statistisches Jahrbuch*):

Year	(Million marks)								
	Agriculture	Industry	Gas, Water, Electricity	Transport	Other Public Works	Housing	Misc	Total Fixed Capital	Working Capital
1924	128	314	235	648	495	−24	248	2044	6028
1925	140	950	539	938	849	687	578	4681	2712
1926	162	451	622	933	1249	893	487	4797	−1999
1927	235	826	469	1167	1569	1541	732	6539	4449
1928	328	1081	731	892	1506	1707	729	6974	2648
1929	259	399	756	691	1500	1721	522	5848	−1256
1930	169	−42	406	450	1008	1255	245	3491	−3821
1931	7	−642	59	12	625	−4	18	75	−5148
1932	−86	−881	−104	−235	395	−436	−255	−1062	−1863
1933	−54	−743	−118	−58	700	−330	−150	−753	615
1934	77	−233	−11	289	2200	136	−100	2358	1282

German conditions immediately after the inflation were peculiar in that a large proportion of the available savings (and borrowings from abroad) had to be devoted to building up stocks of working capital, which had been completely denuded by the inflation. With a temporary set-back in 1926, this re-cumulation of stocks continued up to 1928.

Apart from this factor, however, it is interesting to notice the predominant proportion of the total net

[1] Figures for 1937 and 1938 from evidence before Temporary National Economic Committee by Dr. Lauchlin Currie, 16th May 1939.

investment in fixed capital represented by housing,[1] transport, gas, water, electricity and other public works. In 1934 these were predominant. No detailed analysis is available of the 11·2 milliards of net fixed investment in 1937 and the 11·5 milliards in 1938 referred to above; but it appears that a very large proportion of these is described as "Öffentliche Verwaltung", which included various works of military importance.

For France nothing but very fragmentary information is available. Marschak and Lederer determine the average rate of saving over the period 1927–30 at 25·8 milliard francs, or 11·2 per cent of national income. Of this, 5·5 milliards was invested abroad, leaving 20·3 milliard internal investment. Only part of this can be traced in the statistics of physical investment, owing to lack of statistics about various kinds of public works. Net investment in dwelling-houses was 8·3 milliards, or nearly a third of the total of savings.

Accurate statistics for Holland have been compiled by Marschak and Lederer. Net internal savings were computed from financial statistics at an average of 928 million florins per year in 1925–30, and 934 million florins from production statistics. In addition an average of 124 million florins per year was invested abroad.

The production figures can be analysed:

	Million Florins per Annum, Net New Investment
Buildings	325
Public works . . .	214
Agriculture . . .	60
Industry and commerce .	335
	934

[1] The figures given in the table on p. 420 can be brought up to date by figures given in *I.f.K.*, 9th March 1939, showing net investment in housing at 0·4 milliards in 1935, 1·0 milliards in 1936, 0·9 milliards in 1937 and 0·8 milliards in 1938. The 1929 level was never regained and the trend has been downwards since 1936. Gross value of new houses built (i.e. before deducting for depreciation) was about 1·2 milliards per year higher throughout.

These authors were unable to make any detailed analysis for Switzerland.

Detailed figures for Sweden have been quoted above. Buildings, construction and transport, and communication equipment have been of very great predominance.

Australian figures are available from Dr. Wilson's tables quoted above. Bearing in mind that during recent years about two-thirds of all building represented dwellings, the 1936–37 total of internal investment can be analysed :

	£ million
Public works . . .	28
Dwellings . . .	23
Other buildings . .	14
Agriculture . . .	1
Industry and commerce .	19
	85

Generally speaking, we can say that data from all countries confirm our conclusion of the tendency for relatively less capital to be invested in industry, relatively more in public services, the position of housing being left ambiguous, as time and economic standards advance.

CHAPTER XII

THE DISTRIBUTION OF INCOMES BETWEEN INDIVIDUALS

THE distribution of income between factors of production largely (but by no means completely) determines the distribution of individual incomes. It is conceivable that there should be two countries under comparison, in one of which the main share of the national income went to capital and land, in the other to wages and salaries; but that in the former country capital and land were equally distributed, while in the latter country there was great divergence between salaries; so that a low share of the national income going to capital and land does not necessarily mean an equal distribution of personal incomes. But the possibilities of such discrepancy are small. However, it is important to study the distribution of individual incomes as well as " factor distribution ".

This branch of investigation is extremely easy in comparison with most fields of applied economics. This is in consequence of a remarkable discovery by Pareto of an empirical nature. (The theoretical reasons which have been advanced in support of Pareto's result are as yet quite inadequate.) This law may be simply stated in the following form :

For any level of income x, let there be in any particular community a number n of incomes *at or above* the level x. Then :

$$\text{Log } n = \log \text{A} - \alpha \log x,$$

where A and α are constants.

In other words, if a cumulative frequency curve is plotted of the numbers of incomes, both numbers and incomes being shown logarithmically, the curve will be a straight line.

This remarkable generalisation has been found to hold true for a great number of places and times. The argument must not be pressed too far. There are a certain number of exceptions to this rule, and in India particularly the "line" is found to be distinctly curved.

It will be apparent that the constant A depends on the size of population and the *average* level of income. The constant a is of much greater interest, measuring the dispersion of income, and being quite independent of the average level of income or the size of population. This constant a will therefore be used throughout as a measure of equality or inequality of distribution.

Some astounding misunderstandings and ambiguities by writers on these subjects, particularly by Pareto himself, were cleared up by Bresciani-Turroni.[1] He shows that a low value of a is indicative of an unequal distribution of incomes, and a high value indicative of a comparatively equal distribution of incomes, by comparing the variations of a with all other possible tests of equality or inequality.

U.S.A. — Values of a computed by Professor Tucker, *Quarterly Journal of Economics*, 1938. Alternative figure for 1929 can be computed from the income distribution given in *America's Capacity to Consume*, and is found to be 1·40, as against 1·42 above. The latter figure relates to all incomes and Professor Tucker's only to incomes of $5000 and upwards ; the closeness of the two results indicates that the slope does not change below $5000.

Great Britain. — Figures for 1812 and 1848 quoted by Porter (*J.R.S.S.*, 1851), purporting to show the distribution of all incomes of £150 and upwards. Figures for 1909 computed by Professor Bowley (quoted in *Quarterly Journal of Economics*, 1913–14). Figures for 1929 and 1932 from *National Income and Outlay*.

France. — Official estimate of distribution of all incomes, made in 1894–95, quoted by Levasseur, *Questions ouvrières* (1907). For 1931 and 1934 from tabulation of incomes of 10,000 francs per annum and upwards given in *Statistisches Jahrbuch für das Deutsche Reich*, Internationaler Teil, 1937 (not given in issues for other years).

Hungary. — Do.

[1] *J.R.S.S.*, 1937, Part III.

VALUES OF α

Years	Great Britain	U S A.	Germany: Prussia	Germany: Saxony	France	Japan	Russia	Denmark	Australia	New Zealand	Holland	Hungary	Finland
1812	1·31												
1848	1·47												
1866–71		1·40–1·48											
1872			1·82										
1878			1·76	1·58									
1884			1·72	1·54									
1894					1·68	1·6							
1903						1·92							
1904						1·87							
1905						1·84							
1906						1·86							
1907						1·87							
1908						1·86							
1909	1·31					1·87							
1910						1·92	1·39						
1911						1·94							
1912						1·91							
1913			1·60			1·90							
1914		1·54	1·56			1·89							
1915		1·40				1·89							
1916		1·34				1·78							
1917		1·49				1·58							
1918		1·65				1·55							
1919		1·71				1·61							
1920		1·82											
1921		1·90											
1922		1·71											
1923		1·73					2·07						
1924		1·67					1·96						
1925		1·54				1·71							
1926		1·55	1·79										
1927		1·52											
1928		1·42	1·78										
1929	1·61	1·42											
1930		1·62				1·66							
1931		1·71			1·75						1·70		
1932	1·68	1·76	1·77									1·64	
1933		1·70											
1934		1·77	1·96		1·82				2·25	2·21			2·03
1935		1·75						1·94					
1936		1·72											

HOLLAND. — Do.

FINLAND. — Do.

GERMANY. — Early figures for Prussia and Saxony computed by Engel (*Bulletin de Statistique et de Législation Comparée*, 1888). Figures for 1913 and subsequent years from *Statistical Year Book.*

JAPAN. — Value of α between 1903 and 1919, for all taxed incomes, calculated by Shiomi (*Archiv fur Sozialwissenschaft*, 1925). Later figures by the same author were published in *Kyoto University Economic Review*, 1930. Income distribution for 1890 quoted by Takano, International Institute of Statistics, 1909. Figures for 1903 and 1908 quoted by Kiaer, International Institute of Statistics, vol. 19, Part II p. 102.

RUSSIA. — The figures for 1910–23 and 1924–25 from Litoshenko, *Quarterly Journal of Economics*, 1928.

DENMARK. — Ansaeltelseme til Indkomst og Formueskatten for Skattearet, 1935. All incomes above kr. 2500.

AUSTRALIA. — Calculations by Mr. R. H. Fields The starting-point was in the limits of the classes into which the Federal Income Tax Report divides the higher incomes To each of these was added an amount of £100 to cover concessional deductions — children, insurance and medical expenses. Direct State taxation was then replaced on these incomes No account was taken of rates or land tax and it was assumed that on the average for State purposes taxable incomes were the same in 1933–34 as in 1934–35. For South Australia single and married men's incomes were combined, giving a weight of 80 to married and 20 to single men. Personal Exertion and Property Incomes in each State were combined, the weights being the numbers of earners of personal exertion and of property income in the Commonwealth within each income class. For each State the numbers of taxpayers above each income limit and the income limits were expressed as logarithms and plotted. The number of employed adult males in each State was found as follows :

a = males over 21 at Census.

p = proportion of above unemployed and half part time at Census. (Unemployed men were taken over 20, but part-time men under 21 in the Commonwealth were estimated and each State was reduced in the same proportion.)

q_0 = trade union unemployment percentage in June 1933 (average of second and third quarters in 1933).

q_1 = trade union unemployment percentage for 1934–35 (average of four quarters).

r = relative increase in total population of State (mean population for 1934–35) since Census date.

Then number of males $= a\left(1 - \dfrac{q_1}{q_0}p\right)r$.

These were all assumed to be earning the basic wage or over. For each State the number obtained and the basic wage for 1934–1935 were expressed as logarithms and plotted. Federal Basic Wage rates for Melbourne and Hobart were used for Victoria and Tasmania respectively. These gradients were not derived from the graph but from the data used to plot the graph. The first and last points were used except for Tasmania and South Australia, where the second highest point and the last point were used.

New Zealand. — From Income Tax Report. All incomes above £200.

The greatest measure of equality of income distribution, it will be seen, is that found in Australia and New Zealand. For Soviet Russia no figures are available since 1924–25, but at that date the distribution of income seems to have been definitely less equal than that prevailing in Australia and New Zealand. The coefficients for Denmark and Finland are also about at the same level, while in 1934 Germany reached a similar figure. The early data go to show that in Germany income distribution was becoming more unequal between 1872 and 1913, and that since that date the trend has been towards a much greater equality of income. In France the distribution has been very gradually becoming more equal. Great Britain, at an early date in the nineteenth century, showed a very unequal income distribution, which was preserved up to 1909, and has subsequently been distinctly modified. It remains, however, one of the most unequal distributions to be found anywhere in the world.

The calculation of separate coefficients for different types of income within one community is only possible in the case of Denmark. The results obtained in this case are very interesting.

The figures overleaf show that in the farming community income distribution is highly equalitarian, even

	Income Range, krone	a
Farmers :		
"Husmaend" (small-holders) . .	1,400– 7,000	5·1
"Gaardemaend" (farmers) . .	2,550– 50,000	3·3
Wage- and salary-earners . . .	2,500– 50,000	3·7
Employers and managers :		
Urban	2,500–200,000	1·64
Rural	2,500–200,000	1·73

more so than in the wage- and salary-earning community. Within the community of employers and managers the distribution is much more unequal. But it is interesting to notice that their values of a for town and country differ little, although the general level of incomes is lower in the country. It is the comparative lack of proprietors and managers of businesses (other than farming) in the country, and the generally lower level of their incomes, which causes a generally more equal distribution of income as a whole in rural communities.

The comparative equality of distribution of income in rural communities must usually be assumed from general observation, as formal statistics are not available. Among the few fully comparable statistics available for comparison of income distribution in urban and rural areas appear to be those quoted by Bresciani-Turroni, who for the period 1892–1902 computed the value of a at 1·37 for the Rhineland and 1·86 for East Prussia.

The American taxation statistics are arranged in such a way that it is not possible to compute an income distribution for different classes of taxpayers as it is for Denmark. But it is possible to compute from the American statistics the proportion which different types of income bear to the aggregate income of individuals of certain tax classes. In the very large incomes the preponderance of speculative profits, at any rate during 1929, is quite remarkable. Calculations have been made below for the composition of various types of taxable income in 1929 and 1933, as representing the extremes of prosperity and depression.

Range of Taxable Income

(Dollars)

Percentage Composition of Incomes	5,000–10,000	10,000–25,000	25,000–50,000	50,000–100,000	100,000–150,000	150,000–300,000	300,000–500,000	500,000–1,000,000	Over 1,000,000
1929									
Wages and salaries	45 9	32 6	22 6	15 4	11 5	8·4	5·9	3·8	1·8
Interest	7·3	9 0	9 2	8·5	6 7	5·5	5·3	4 4	4 2
Administration of trusts	1·5	2·6	3·6	3·2	2·1	1 5	1 6	0·5	0 6
Rent	4·9	4·2	3·3	2·5	1·8	1 3	0 8	0 8	0·7
Individual enterprises and partnerships	24 5	19·5	14·0	11 6	11·6	12·1	11·1	10·4	6 9
Dividends	9·7	19·3	28 4	32 9	33 2	29·5	27 5	27·7	23·9
Net profits on sales of goods and securities	6·2	12 8	18 9	25 9	33·1	41 7	47·8	52 4	61 9
	100·0	100·0	100·0	100·0	100 0	100 0	100 0	100 0	100 0
1933									
Wages and salaries	51·9	38 9	28 8	21 6	17 3	10·2	9 9	5 6	3 5
Interest	8·6	10 1	10·1	8 4	6 6	7 0	4 3	3·8	2·8
Administration of trusts	3·0	4 6	4 8	3·6	2·1	1·5	3 1	1 1	0 4
Rent	3 1	2·7	2 2	1 5	0·9	0·8	0 1	1·2	0 0
Individual enterprises and partnerships	17·3	15·8	15 6	14 9	15 3	12 8	8 2	4 6	1·4
Dividends	11 9	21·7	28 6	37 6	40 7	47·7	48 7	59·7	50 8
Net profits on sales of goods and securities	4 2	6 2	9 9	12·4	17·1	20 0	25·7	24 0	41·1
	100 0	100·0	100·0	100·0	100·0	100·0	100·0	100 0	100 0

The table on p. 429 shows the predominance, even in depression, of speculative profits as a source of inequality of income. In the obtaining of income of this nature it is clearly a case of "to him that hath shall more be given". The receipt of rents from the ownership of land and buildings was, in comparison, a trifling source of inequality. In the British and German tax systems such speculative profits are not reckoned as part of income. It appears that if these had been included, Britain and Germany would have shown lower values of a than those calculated, though it is impossible to estimate the extent.

In the U.S.A., Britain and Germany, taking the long view, we can see in each case a tendency first towards increasing inequality of income, which reaches a climax and is then followed by a period where the trend is towards greater equality of income. In Great Britain and Germany the turning-point came in 1913, in the U.S.A. in 1929, while in Japan it does not appear yet to have been reached. Prior to the turning-point the movements were slight; indeed, the distribution of incomes in Great Britain seems to have been much the same in 1909 as it was in 1812; in the U.S.A. much the same in 1929 as it was in 1866–71. But the recent trend towards greater equality of incomes in each of these countries has been very marked.

These gradual changes in the direction of greater or less equality of distribution must have an important effect on the proportion of national income saved. The high figures of savings shown by Great Britain in 1913 and by the U.S.A. in 1929 must be regarded as a result of a temporary inequality of distribution rather than as being in any sense a normal level.

How sensitive indeed the total of savings must be to changes in the distribution of income is shown by the following figures [1] relating to the U.S.A. and Germany.

[1] American figures from *America's Capacity to Consume*. German figures quoted by Wagemann, *Kapitalbildung und Steuersystem* (Konferenz nach Eilsen, Zweiter Teil, p. 197).

These are the only countries for which we have figures showing the amounts saved by different income-groups.

Income, dollars per annum	Farm Families		Non-farm Families		Unattached Individuals	
	(a) *	(b) †	(a)	(b)	(a)	(b)
None	..	-84	..	-1,504	..	-301
0–500	-27	-117	22	-398	-14	-64
500–1,000	-3	-35		.	-4	-71
1,000–1,500	8	99	1	73	2	42
1,500–2,000	22	225	6	404	9	203
2,000–2,500	30	260	8	514	13	169
2,500–3,000	36	216	10	500	15	108
3,000–3,500	40	176	12	529	18	93
3,500–4,000	45	158	14	456	20	74
4,000–4,500	49	127	15	404	21	61
4,500–5,000	52	98	16	369	22	54
5,000–6,000	57	123	18	617	23	88
6,000–7,000	61	75	20	513	25	75
7,000–8,000	63	42	23	419	26	62
8,000–9,000	71	27	26	375	28	55
9,000–10,000	68	15	29	343	29	50
10,000–15,000	..	..	35	1,296	32	188
15,000–20,000	..	..	38	707	35	131
20,000–25,000	..	..	38	502	38	99
25,000–30,000	..	..	39	381	39	76
30,000–40,000	..	..	39	544	44	114
40,000–50,000	..	..	41	409	44	87
50,000–75,000	..	..	43	695	46	149
75,000–100,000	..	..	46	470	48	102
100,000–250,000	..	..	49	1,069	51	218
250,000–500,000	..	..	54	810	58	302
500,000–750,000	..	..	58	517		
750,000–1,000,000	..	..	59	321	63	608
Over 1,000,000	..	..	66	2,399		
TOTAL	20	1405	20	13,734	17	2643

* (a) Percentage of income saved † (b) Aggregate savings, $ million.

Some suggestive comments on the trend of savings in relation to the trend of income distribution between 1914 and 1929 are made by Cleona Lewis,[1] who has examined the relative rate of growth of the aggregate

[1] *Journal of Political Economy*, August 1935.

income in various income groupings of $5000 p.a. and upwards. Between 1922 and 1929 aggregate income between $5000 and $10,000 rose in the ratio 1·70, between $10,000 and $25,000 in the ratio 1·79, and so on up to the class $1,000,000 and over, which increased in aggregate income ninefold. Out of $17,782 millions estimated to have been saved in 1929, $15,073 millions was saved from incomes over $5000, and it is interesting to compute the amounts saved in each of the earlier years, on the assumption that the proportion of income saved in each of the income groups specified remained constant. This table thus measures the effect on savings of changes in

Income Range $000 p.a	($ thousand)		($ million)							
	Aggregate Income	Aggregate Savings	Savings computed from 1929 Ratio of Savings to Income							
	1929	1929	1928	1927	1926	1925	1924	1923	1922	1914
5–10	12,123	2,879	2,750	2,500	2,470	2,230	1920	1700	1700	560
10–25	8,064	2,923	2,940	2,720	2,660	2,570	2070	1840	1640	650
25–50	4,022	1,611	1,720	1,520	1,450	1,500	1180	1000	890	380
50–100	3,191	1,416	1,600	1,320	1,190	1,220	920	720	690	310
100–150	1,363	644	710	530	480	480	320	230	220	120
150–300	1,923	946	1,010	680	570	570	320	230	230	140
300–500	1,111	809	850	560	440	440	220	160	150	110
500–1000	1,728	995	1,000	560	470	490	240	140	160	110
1000	4,321	2,850	2,610	1,410	1,160	990	370	360	330	320
Above $5000	37,946	15,073	15,190	11,800	10,890	10,490	7560	6380	6010	2700
Net capital formation (Kuznetz)		10,082	8,168	8,859	9,734	10,644	6823	9691	5802	..

aggregate national income and its distribution, apart from changes in intrinsic propensities to save.

The results thus obtained are compared with the movements of net capital formation as estimated by Dr. Kuznetz in *National Income and Capital Formation.* The main cause of the very big difference between his figure of $10·1 milliards and the Brookings Institute figure of $17·8 milliards is that in Dr. Kuznetz's work speculative gains are not included either in income or in savings, while they are so included in the Brookings calculation. But it appears that actual achieved savings over the period 1922–29 were rising less rapidly than the hypothetical figure computed from an assumed constant

proportion of saving in each income group. This provides some indication that in general the amount saved out of any given income, *speculative gains being included in income*, was falling over the period 1922–29.

The figures given by Professor Wagemann for Germany relate to 1928, and a similar calculation regarding the effect of income distribution on savings can be made for 1934, 1932, 1926 and 1913 from data given in *Statistisches Jahrbuch*. (In the case of 1913 the limits of each income group have been reduced by about 30 per cent to give incomes of about the same purchasing power as in the post-war years, and aggregate income raised in the same proportion.)

Income Range, thousand reichsmark	1928			Savings on Basis of 1928 Ratio between Savings and Income			
	Number of Incomes, thousands	Aggregate Income, million reichsmark	Savings, million reichsmark	1934	1932	1926	1913 (converted to Post-war Values)
Under 3	27,982	33,229	252	212	187	227	240
3–5	1,991	7,508	512	436	391	384	375
5–8	779	4,776	404	286	268	275	313
8–16	337	3,593	297	155	118	209	244
16–50	115	2,836	423	216	178	311	521
50–100	12	832	215	112	82	164	516
Over 100	5	1,034	500	229	171	383	1,765
	31,221	53,808	2603	1646	1395	1953	3,974
Net savings (1913 raised to post-war purchasing power)			8800	3400	−3100	3900	11,800

In this case the relationship is not very close. In 1928 private savings only appear to have contributed 2·6 milliards out of a total saving of 8·8 milliards. Movements from year to year have been in the same directions as indicated by the calculations of private savings. But it may be said that in Germany, even as early as 1913, the distribution of personal incomes had ceased to count as the main determining factor of the amount of saving.

CHAPTER XIII

THE CHANGING TENDENCIES OF CONSUMPTION

In 1888 was enumerated the well-known proposition now often referred to as Engel's Law.[1] In the *Bulletin de Statistique et de Législation Comparée* for that year Engel published the results of an extensive collection of family budgets which he had largely obtained by his own efforts. He enumerated the hitherto apparently unsuspected generalisation that, as income rises, the proportion spent on the necessaries of life tends to diminish. The following are his actual figures :

Income, marks per year	Percentage of Income spent on Food	Percentage of Income spent on Food, Clothing, Fuel and Medicine
Under 525	66 2	101·3
525–2,000	61·9	93·3
2,000–6,000	42·0	69·8
6,000–20,000	26 0	57·6
20,000–100,000	17·0	48 8
100,000 upwards	8·9	28·0

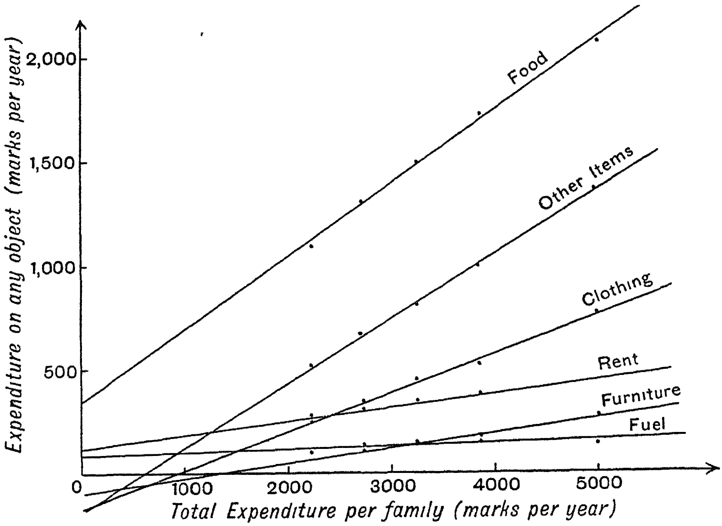
Not long after was enumerated the so-called Schwabe's Law, claiming that the proportion of income spent on rent also declines as total income rises. This law is also generally true, but a gradual decline of the average amount spent on rent conceals very sharp and striking fluctuations of marginal expenditure on rent, as Dr. Singer[2] has recently shown.

A great deal of material showing how consumers distribute their expenditure at different income levels has since been collected, though very few attempts have

[1] Engel was an official in the Prussian Statistical Office and is not to be confused with Friederich Engels. [2] *Review of Economic Studies*, 1936.

been made to systematise this discordant mass of information apart from the thorough systematisation undertaken in *America's Capacity to Consume.*

A simple but far-reaching empirical rule was discovered by Professor Bowley and Mr. Allen in their book *Family Expenditure*, published in 1935. They showed that, if expenditure on any particular commodity or group of commodities were plotted against income as a whole, the results lay along a straight line within the range of incomes studied. The following diagram gives, for example, the results obtained from the German inquiry into family budgets of 1927–28:



It will be noted that the lowest scale of expenditure was rather over 2000 marks per year, which represents about a minimum scale of subsistence for a family. Nevertheless there is a certain purpose to be served by producing the curves backward to the point of zero income. The order in which these curves cut a vertical line representing zero income measures what Bowley and Allen describe as the "order of urgency". At the point of zero income certain values remain positive and

others have become negative. Food, rent and fuel (in that order) represent the most urgent needs ; furniture, clothing and miscellaneous expenditure represent the less urgent or more postponable forms of expenditure.

The measurement of these urgencies is by no means the sole reason for constructing such a diagram. Next we proceed to measure the slopes of the various lines, indicative of the rate at which expenditure on any particular object increases with increasing income. This factor is called by Allen and Bowley k, and it is clear that it is an additive characteristic. That is to say, the value of k for food as a whole is equal to the sum of the values of k for each different type of foodstuff.

If any particular family spends a fraction w of its income on one object, and the community as a whole spends a fraction $\bar{w}$, then the average income elasticity of demand for this commodity is given by

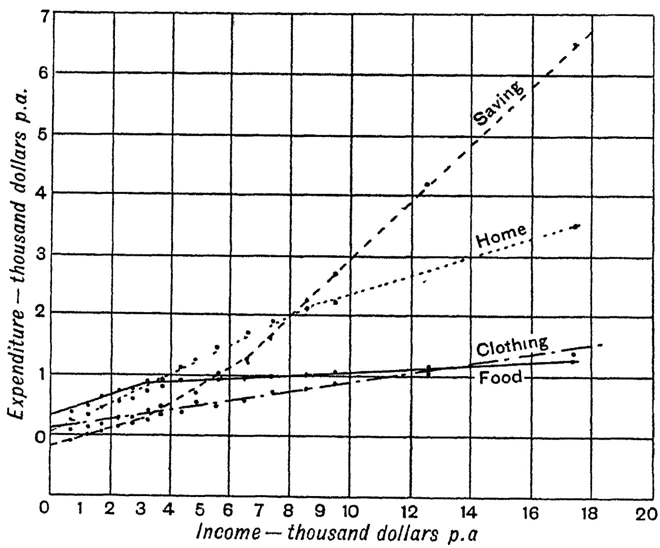
$$\bar{\eta} = \frac{k}{\bar{w}}.$$

Income elasticity is the ratio between the increment of consumption of this commodity and an increment of income, other factors remaining constant. It may vary at different income levels, but the above formula gives the average for the community as a whole. By the use of this formula Allen and Bowley are able to make some interesting calculations of income elasticities of demand, as shown in the attached table of " Family Expenditure ".

As incomes increase, there is clear evidence of departure from linearity of the relation between income and expenditure on any one object. In other words, k is not constant but varies with income. The data for non-farm families collected in *America's Capacity to Consume* give the distribution of expenditure for families with incomes up to $20,000 a year. Unfortunately the classification of expenditure groups is not the same as that previously used, rent, furniture

and fuel being lumped together under the heading "Home". The diagram shows very marked upward curvature in the line representing savings, and a downward curvature in the line representing "Home". Only very slight downward curvature is noticeable in the line representing clothing, whereas the line representing food can be described as a curve of rapidly diminishing slope up to an income of \$4000 a year, followed by a straight line of a slope of 0·032 only. The following table and diagram summarises the information:

	(Income, \$ per annum)					
	k				$\bar{w}$	$\bar{\eta}$
	0–3000	3000–8000	8000 up	Weighted Average		
Clothing .	092	·092	·092	·092	·109	·85
Food .	·177	·032	·032	·085	·221	·38
Savings .	·170	·284	·480	·308	·196	1·57
Home .	·245	·245	·160	·216	·234	·92



The average income elasticity of demand for food for the community as a whole is only 0·38, although it is clearly higher in the lower ranges of incomes. The 1918 figures for the U.S.A. quoted by Allen and Bowley, in which the lower incomes preponderate, give a value of 0·8. In Europe this figure shows values ranging from 0·3 to 0·9.

Probably the most interesting thing about these figures, derived from *America's Capacity to Consume* and covering a range of incomes up to $20,000, is that income elasticity appears to be less than unity for all the groups of expenditure except savings. If we created another class for all items not covered, we should find in fact that it had a slope of about 0·24 and an income elasticity between 0·9 and 1. This means that when there is an increase in national income, if it is not accompanied by a change in income distribution, there are practically no objects of expenditure in which the proportionate expansion will be as great as in national income, except savings. The maintenance of economic equilibrium is clearly difficult under these circumstances except in a period of very great investment opportunities.

For Great Britain all information of this nature is very incomplete. A large-scale inquiry into family expenditures for families with incomes below £250 is now being undertaken by the British Ministry of Labour.

Sir John Orr's collection of food budgets at different income levels [1] make possible a determination of k and $\bar{\eta}$ for food as a whole, and for a number of important foodstuffs, with considerable accuracy. Comparing the consumptions of his Class I and Class V (assumed average incomes, 8s. and 37s. per head per week respectively), we have the following data :

[1] Published in *Food, Health and Income.*

	k	$\bar{w}$ *	$\bar{\eta}$
Food as a whole	·276	·254	1·09
Meat	·072	·070	1·03
Milk (fresh)	·028	·021	1·33
Eggs	·0092	·0103	0·89
Butter	·017	·0130	1·31
Potatoes	·0017	·0087	0·20
Other vegetables	·0144	·0094	1·54
Fruit	·0305	·028	1·09
Sugar purchased as such	·0031	·0069	0 45
Sugar consumed in other forms . .	·0026	·0046	0 56

* On basis of national income of £4238 millions (including indirect taxation) in 1934.

The relationship between total income and expenditure on any given commodity, within the range examined, was generally linear except in the case of milk. Here we have :

Income Range, s per week	k	$\bar{w}$	$\bar{\eta}$
8–12	·0625	·040	1 56
12–37	·0227	·037	0·62

In the higher ranges of income, above an average of 37s. per head per week, k falls considerably for all foodstuffs. Some 90 per cent of the population are included in the income range covered by the above tables, i.e. below 37s. per head per week.

The low income elasticity of demand for sugar and potatoes is noticeable, as is the high elasticity for milk, butter and vegetables. Demand for these products should increase rapidly with rising national income. $\bar{\eta}$ was also high for food as a whole as compared with the results of previous inquiries, or with other countries.

Bowley and Allen were able to determine $\bar{\eta}$ for individual foodstuffs in certain European countries. The results are similar.

About the centre of the income range, the value of k for fruit in the German data rises from 0·063 to 0·090

($\bar{w}$ = 0·035). Similarly the value of k for vegetables and fruit taken together rises from 0·075 to 0·143 in Sweden

	Belgium, 1928–29	Germany, 1927–28	Sweden, 1923	Finland, 1920–21
Rye bread	..	−0·6	1·2	1·0
Wheat bread	..	1·1		
Flour	..	..	−0·3	−0·5
Milk	0·6	1·3	0·95	1·1
Butter	1·8	2·35	1·5	1·0
Margarine	−1·4	−0·65	−0·3	−1·3
Eggs	1·35	1·6	1·5	..
Potatoes	0·2	..	0·2	0·4
Other vegetables	1·2	1·45	..	..
Fresh fruit	2·3	..	..	..
Sugar	0·6	0·5	0·8	0·8
Coffee	1·0	1·9	0·9	1·2

($\bar{w}$ = 0·049) and from 0·026 to 0·061 in Finland ($\bar{w}$ = 0·020). These indicate very high elasticities.

Some further light is thrown on expenditure in England in the higher income ranges by a collection of budgets collected by the Bank Officers' Guild, and by a private collection of budgets, covering incomes up to about £3000 a year, made by Mr. Nigel Balchin in his witty work *Income and Outcome*. The former are mostly in the range £250 to £700 and cover much the same field as the 1926 Clerks' Budgets quoted by Allen and Bowley (average income £482), though the Bank Officers' figures make possible a more detailed analysis of expenditure.

Percentage Distribution of Expenditure given in "Income and Outcome"

	(£ per annum Income)			
	250–499	500–999	1000–1999	2000 upwards
Rent and repairs to house	21·8	14·8	12·2	10·1
Cleaning	3·5	3·9	4·4	2·2
Other housekeeping . .	27·1	19·3	12·9	13·3
Fuel and light . .	2·8	3·2	2·3	3·7
Telephone . . .	0·5	1·2	0·9	0·6
Furniture . . .	1·4	. .	. .	. .
Clothes	11·9	10·7	8·7	6·4
Income tax . . .	1·7	5·6	9·8	12·0
Medical	1·2	1·3	1·4	1·1
Insurance . . .	1·7	4·3	6·1	3·7
Education . . .	2·7	7·6	10·4	7·5
Casual	6·1	6·2	5·9	3·8
Amusement . . .	2·6	3·2	2·6	4·8
Servants . . .	2·2	7·3	5·0	11·7
Holidays . . .	5·9	3·4	5·4	3·2
Car	2·3	8·9	10·7	9·3
"Margin" . . .	2·5	4·2	0·5	3·7
Dog	0·2	. .	. .	. .
Garden	. .	. .	0·1	0·8
Travel	0·1	0·1	0·2	. .
Given away . . .	0·9	0·7	. .	2·6

AVERAGE DISTRIBUTION OF A BANKMAN'S FAMILY EXPENDITURE

Item	Over 249 and under 300	Over 299 and under 400	Over 399 and under 500	Over 499 and under 600	Over 599 and under 700	700 up to 1700	Over-all Average
Food and Drink	27 61	25·67	25·35	21·90	23·31	20·65	24 30
Clothes . .	9·28	10·16	11·21	10·35	10·00	9·07	10·20
Housing . .	18 26	14·91	12·05	13·03	11·93	10 25	13·45
Fuel and Light	5·95	5·03	4·30	3·54	3·90	3 91	4·51
Group A:							
Railway fares .	3 11	1·96	2·16	1·98	2·24	1 33	2·10
Bus, tube and tram fares .	1·98	1·64	1·10	1·34	0·41	0·65	1·23
Soap and soda	0·84	0·81	0·63	0 51	0·51	0·43	0 65
Tobacco in all forms . .	1·98	2·48	2·37	1·91	1·03	1·08	1·93
Domestic ware	0·54	0·52	0·46	0 34	0·10	0·89	0·48
Newspapers .	1·02	0·64	0·70	0·47	0·65	0·39	0·64
Motor Car or Cycle . .	0·87	3·30	3·19	4 97	5·94	4·45	3·73
Group B:							
Income Tax (Scheds. D and E) .	1·47	2·62	4·21	4 37	6·80	8·58	4·42
Insurance (other than car) . .	6·70	4·91	5·21	5·92	4·88	5 99	5·32
Education .	0·29	0·45	1 66	2·20	2·78	3·27	1 60
Medical attention . .	2·92	1 66	2·58	1·79	2 29	2·62	2·23
Holidays .	4·06	4·30	3·78	4·26	3·99	4 41	4·14
Furniture .	2 66	2 70	2 86	1·75	2·52	3·70	2·72
Domestic help	..	2 17	3·46	2·09	2·65	3·62	2·40
Miscellaneous	10·46	14·07	12·81	17·28	14 07	15·61	13·95
	100·00	100·00	100·00	100·00	100 00	100·00	100·00
Number of records . .	8	18	12	8	9	9	64

The results may be summarised as follows :

	k		$\bar{w}$	$\bar{\eta}$
	Bank Officers' Guild	" Income and Outcome "		
Food	·181	·110	·268	0·4–0·7
Rent	·077	·088	·092	0·8–0·9
Clothing	·093	·061	·096	0 6–1·0
Fuel	·040	·041	·038	1·0
Motor car	·099	·122	·024	4–5
Domestic service	·17	·127	·038	3·5–4·5
Travel	·10	..	·041	2·5
Tobacco	·008	..	·035	0·2
Medical attention	·025	..	·018	1·4
Furniture	·040	..	·024	1·7
Amusement	..	·056	·025	2·2

This table shows a very varying range of income elasticities, and gives some idea of how consumption in England has changed, and will continue to change, with rising average real incomes per head.

At the other end of the scale of consumption we have some interesting figures for China. The budgets of a number of North Chinese families were collected by Dittmer :[1]

RURAL STANDARD OF LIVING IN CHINA, 1912–18
(Chinese Dollars : about 0·5 U.S. Dollar)

Incomes, $ Chinese per annum	100 Chinese Families		Income	Total Expenditure	Food	Clothing	Fuel and Light	Rent	Rest
	No. of Families	Size of Family							
50–69	11	2 5	59 0	59 0	45 3	3 0	4 5	5 3	0 8
70–89	14	3 2	78 5	76 7	61 5	3 3	4·3	6 1	1 5
90–109	32	4 2	100 2	97 0	75 7	5 7	5 6	7 8	2 1
110–129	12	4 3	119 8	117 7	85 6	10 6	8 8	9 0	3 7
130–149	14	4·5	138 8	133 8	96 9	12 0	9 8	9 8	5 5
150–	17	5 0	188 8	184 1	132 4	18 0	10 5	12 4	10 2

His results are roughly confirmed by those obtained ten years later by Professor Buck in *Chinese Farm Economy* relating to the expenditure of average farm

[1] *Quarterly Journal of Economics*, 1918–19, p. 107.

families. These relate to a later period (1921–30), when prices were higher.

Farm Family Expenditures
(Chinese Dollars per Year)

	North China	East and Central China
Food	123·7	156·4
Rent	8·3	16·2
Clothing	12·2	25·4
Fuel	21·0	32·2
Medicine	1·4	2·6
Religion, education, recreation	12·8	33·1
Smoking, drinking, toilet, jewellery	5·3	18·2
Furniture	1·8	1 4
Service, weddings, lawsuits	4·1	3·1
	190·7	288·6

Professor Dittmer's data lie very closely along straight lines, which when produced agree with Professor Buck's figures except for fuel. From Professor Dittmer's figures we can calculate the following values :

	k	$\bar{w}$	$\bar{\eta}$
Food	·89	·78	1·14
Clothing	·115	·06	1·9
Rent	·058	·08	0·7
Fuel	·4	·6	0·7
Miscellaneous	·08	·02	4·0

When we project these data for comparison with the comparative affluence of South China, we find a marked upward turn in the curve for miscellaneous expenditure, and a marked downward turn in the slope of the curve for food. Clothing and rent are almost exactly in line with the lines previously obtained.

In the starvation conditions of North China the figure for elasticity of demand for clothing and for miscellaneous commodities is exceptionally high.

In India, where average incomes are at a slightly higher level, an interesting difference is found. The rate of income elasticity of demand falls for clothing and miscellaneous requirements, but rises for savings. From 729 industrial workers' budgets in Cawnpore (*Royal Commission on Labour in India, Evidence*, vol. xi.) we find:

(Rupees Per Month)

Number of Budgets	Income	Savings	Food	Clothing	Fuel and Light	Rent	Household Requisites	Miscellaneous
128	12·99	−0·74	6 61	1 11	0·94	1 24	0 25	3·59
380	22 16	0·33	10·61	1·66	1·40	2 06	0·40	5 72
145	34·42	1·03	15·91	2 40	1·88	2 89	0·58	9 74
76	45·43	2·26	20 62	3 05	2·21	3·12	0·64	13·51
729	25·53	0·61	11·98	1 85	1 50	2·18	0 44	6·95
$\bar{\eta}$		3 9	0·9	0 8	0·7	0 7	0·7	1·1

Incidentally it is of interest to compute values of k and of $\bar{\eta}$ from the original data given by Engel:

	k	$\bar{w}$	$\bar{\eta}$
Food . . .	·36	·54	0·7
Clothing, fuel and medicine . .	·24	·24	1·0
Rent and miscellaneous . .	·4	·22	1·8

These results show a remarkable similarity to those obtained for Germany in 1927–28.

These studies of successive orders of urgency and of the income elasticity of demand for different types of goods and services show universally similar results. In every case the income elasticity of demand for food tends to become very low as real income rises. Further, it must be remembered that these figures always represent income elasticity of demand for food as purchased at retail. If for any reason the cost of the services of transport and distribution remains constant at a time

when the prices of primary products are falling (it has been shown in Chapter IX that this is the case), there may be virtually no elasticity of demand for food itself as apart from the services of retailing it.

In the same way are to be found higher income elasticities for the produce of manufacturing industry, and higher still for services. With these universal forces constantly changing the structure of demand, it is not hard to find the basic reason for the steady shift of the working population from primary to secondary, and from secondary to tertiary industries. These tendencies may be accentuated by increasing productivity per head in the primary and secondary industries. The whole situation could not be more neatly summarised than in a table prepared by Ezekiel.[1]

U.S.A.

(1900=100)

Year	Production per Worker Engaged			Volume of Production per Head of Whole Population (Total Production in 1900=100)	
	Agriculture	Manufacture	Mining	Farm Production	Manufactured Production
1870	58	64	36	27·4	27·0
1880	77	75	56	33·6	37·1
1890	82	93	84	32·6	53·3
1900	100	100	100	36·0	64·0
1910	100 *	117	104	28·4	90·7
1920	119	131	139	32·6	101·5
1930	141 †	163	147	33·3	121·5

* 1908–11. † 1928–31.

Between 1870 and 1930, American demand per head of population for farm produce increased only by 22 per cent; for manufactured products the increase was four and a half-fold. At the same time, productivity per worker engaged increased by 143 per cent in agriculture and 155 per cent in manufacturing industry. This

[1] *Annals of the American Academy of Political Science*, November 1936.

simple tabulation expresses both the basic factors at work behind the secular average for all population. They also illustrate the peculiar strength and violence of the forces of economic progress in the U.S.A., showing that tremendous further adjustments are needed before economic equilibrium is obtained.

CHAPTER XIV

THE TERMS OF EXCHANGE

World trade towards the end of the seventeenth century, according to Sir William Petty, amounted to £54 millions per year, made up as follows :

	(£ million)	
	Total Exports	Of which to England
Holland and colonies	21	3
England and colonies	10	..
France and colonies	5	1·25
Other countries	9	..
	45	..

The value added by shipping services represented then a very substantial proportion of the world's trade. The gross freights earned by English shipping trading in foreign parts were £1,500,000 per year, and presumably a great deal more gross was earned from the coastal trade. Petty's estimate of the aggregate annual cost of maintenance and victualling of 500,000 tons of English shipping was £2,250,000 per year, and he estimated its current capital value at £4,000,000, on which interest was presumably being earned. The world's shipping at that date was owned as follows :

	Thousand Tons
Holland	900
England	500
France	100
Germany, Sweden, Denmark	250
Italy, Spain, Portugal, etc.	250
	2000

Much of English (and Dutch) export trade at that time consisted of re-exports from the colonies, which are treated as part of the mother countries in the above table. Petty enumerates the main items in English exports at that time :

English Produce		Colonial Produce Available * for Re-Export	
	£		£
Woollen goods .	5,000,000	North American .	200,000
Lead, tin and coal .	500,000	Central American .	600,000
Colonists' effects .	200,000	Indian . .	800,000
		Irish agricultural produce . .	800,000
		Other Irish and Scottish goods .	500,000

* Davenant estimates that £350,000 of American produce was retained for consumption in England, and £1,300,000 of Indian produce. The former was fully balanced by exports, but only £500,000 of the latter, indicating the large profits which were being made by the commercial (and military) exploitation of India

to which list he adds, without a blush, £60,000 for gold and silver plundered from Spanish ships and £20,000 from the sale of slaves from Africa. Sir William was under no illusions about the purpose of economic life. "The great and ultimate effect of trade is not wealth at large, but particularly abundance of silver, gold and jewels, which are not so perishable, nor so mutable as other commodities."

However, we may admire his scientific analysis of statistics while deploring his mercantilist morality.

The next enumeration available of world trade as a whole appears to have been that made by Leone Levi for 1851.[1] Re-including India and China, which he omits from his totals, the world at that date had a total importation of £336 millions and exports of £305 millions. In order of importance at that date the trading countries of the world were :

[1] *J.R.S.S.*, 1852, p. 111.

European			Non-European		
	(£ million)			(£ million)	
	Imports	Exports		Imports	Exports
Britain	100·0	70·0	U.S. America	39·0	32·0
France	45·0	56·0	India	12·0	20·0
Hamburg	22·0	20 0	The Brazils	6·5	5·5
Bavaria	0·8	1·2	Cuba	5·7	5·6
Holland	22·0	18·0	China	2·0	5·0
Belgium	16·0	15·0	Canada	4·0	3·0
Russia	14·0	14·0	Java	2·0	5·0
Sardinia	9·0	6·5	Egypt	2·5	2·0
Papal States	1·5	1·2	New South Wales	1·5	1·8
Spain	6·0	5·0	Van Diemen's Land	0·6	0·5
Denmark	5·5	3·5	Ceylon	1·2	1·5
Sweden	2·3	2·5	Mauritius	1·2	1·2
Portugal	2·5	1·6	South Africa	1·1	0·5
Greece	1·0	0·8			

From doing 22 per cent of the world's trade in the seventeenth century, Great Britain had risen to doing 30 per cent [1] of the world's trade in 1851. Holland had fallen to fifth place, and the U.S.A. and Germany were already emerging as great trading nations.

In this year of the Great Exhibition the relative predominance of Great Britain appears to have been at its zenith. Between 1851 and 1860 British trade expanded exceedingly rapidly, but the trade of other countries more rapidly still. By 1860 the sum of world [2] imports and exports had risen to £1425 millions, of which Britain's share was £375 millions, or 26·3 per cent, and by 1885 was £642 millions out of a world total of £3055 millions, or 21 per cent. It is a very long time since Britain ceased to be the workshop of the world.

A continuous record of British trade since 1697 is contained in an exceptionally valuable recent work by Dr. Werner Schlote of the Institut für Weltwirtschaft,

[1] The export figures quoted above appear to exclude re-exports, which would raise the total by another £13 millions.

[2] World trade from 1860 to 1885 given in Neumann-Spallart's *Uebersichten der Weltwirtschaft*.

Kiel, *Entwicklung und Strukturwandlungen des englischen Aussenhandels von 1700 bis zur Gegenwart.*[1] Owing to the system of recording British exports and imports up to 1854 at " official values ", data up to this year have to be tabulated on a basis of volume rather than value. Dr. Schlote re-calculates them to 1913 price level. From 1800 to 1854 he makes estimates of the current money value of trade on the basis of Jevons's price index.

In 1697 and 1698 trade was restricted by the French war, but for the average of the three years 1699–1701 imports averaged £5,502,000 per year and exports £3,611,000 at 1913 prices. These results are not inconsistent with Petty's estimates of £10 millions, as the average price of manufactured textiles and of re-exported colonial produce in 1913 was only one-third of what it had been at the end of the seventeenth century.

For the average of the three years 1789–91 the volume of imports, again at 1913 prices, was £16·3 millions and of exports £10·8 millions, in either case almost exactly a threefold increase over 1699–1701. Population during this period increased by 33 per cent [2] and the volume of industrial production, according to Dr. Hoffman's index, had about doubled. Foreign trade must, therefore, *by volume* have represented an increasing share of the national product. The money value of the national income was computed by Beeke [3] in 1800 at £218 millions for Great Britain, or, say, £250 millions for U.K., out of which the current value of exports (including re-exports) was £55 millions, or 22 per cent. This is almost exactly the same ratio as prevailing between the *money* value of exports and national income in the seventeenth century. An export trade covering an increasing share of the national income by volume and a constant share by value clearly indicates a movement against Britain of the terms of trade. The next period for which we have satisfactory data of the money national income is

[1] Gustav Fischer, Jena, 1938.
[2] Cohn, *Economic Journal*, 1912.
[3] In his book *Produce of the Income Tax.*

1860–69, in which decade income averaged £899 millions per year and exports and re-exports £205 millions. The relative importance of exports, in money terms, was now 22·8 per cent of the national income. In volume, on the other hand, exports had risen 8·7-fold from 1801 to 1860–69, while the volume of industrial production as a whole rose sevenfold.

It is clear, though it is not generally realised, that throughout the eighteenth and first half of the nineteenth centuries Great Britain was parting with a considerably increasing fraction of her *real* national income in the form of exports, for a return which made a diminishing or stationary relative contribution to money national income. Exports were falling in price relative to production for the home market, and even more relative to imports. In other words, it was a period of rapid worsening of the terms of trade.

The long-period movement of the terms of trade is a subject, interest in which is comparatively recent. In 1919, in a casual paragraph in *Economic Consequences of the Peace*, Mr. J. M. Keynes startled the economic world by remarking that in the years prior to 1914 the manufacturing countries of Europe were obtaining their foodstuffs and raw materials at steadily worsening terms of trade. In 1923 Sir William Beveridge [1] showed that British terms of trade had been approximately stationary from 1900 to 1913, while they had been moving in Britain's favour in the years before 1900. He showed, however, that since 1880 the world's production of basic foodstuffs had expanded steadily to keep pace with population. Calculations of movements of the terms of trade since 1880 have also been made by Silverman,[2] but data covering the longest period are those computed by Dr. Schlote. He made use of the results of an extensive enumeration of current prices of articles of all types made by a Committee of the House of Lords in 1694, and, by use of a weighted average, links these data

[1] British Association Meeting, Presidential Address.

[2] *Review of Economic Statistics*, 1926.

on to his general series through the period 1854–60.

The terms of trade generally show a marked movement in accordance with the phase of the trade cycle, and therefore in the first instance we may study the long-period trends by use of data averaged over the whole period of each trade cycle. From 1860 onwards the same periods are used as in the previous calculations on the trend of national income. Each period ends about three years after the peak period of the trade cycle.

INDEX NUMBERS
(1913 = 100)

Years	Import Prices	Export Prices	Terms of Trade	Year	Import Prices	Export Prices	Terms of Trade
1694	68·0	197·0	290·0	1919	243	292	120 2
1801–15	203·3	288·0	141·7	1920	288	368	127 8
(war				1921	186	272	146·1
period)				1922	149	199	133·7
1816–28	144·7	178·8	123·6	1923	148	189	127·9
1829–42	117·4	117·6	100·2	1924	154	190	123·2
1843–50	100 8	93·1	92·4	1925	155	185	119·3
1851–59	110 0	90·7	82·6	1926	141	174	123·3
1860–69	129·2	111 1	86 0	1927	136	161	118·3
1870–76	118·6	108·9	92·0	1928	136	159	116·9
1877–85	103·5	85·3	82·4	1929	133	155	116·5
1886–93	87·1	77·4	88·8	1930	115	148	128·7
1894–1903	79·6	77·7	97·6	1931	93	133	143·1
1904–10	90·8	88·7	97·7	1932	86	122	141·8
1911–13	98 3	96·7	98·5	1933	82	119	145·1
1914–18	160·2	150·0	93·6	1934	85	121	142·3
(war				1935	87	121	138·9
period)				1936	91	123	135·2
1919–23	202·8	264·0	130·1	1937	104	133	127·8
1924–32	127·7	158·5	124·1	1938	98	135	137·8
1933–37	89·6	123·4	138·0				

The magnitude of the adverse movement of the terms of trade between the beginning of the eighteenth century and the eighteen-fifties is very marked. It would hardly be right to conclude that this long period of industrialisation was not worth while: but we can conclude that

nearly all its benefits went to the consumer rather than to the producer. From the 1850's onwards, the increasing productivity of agriculture throughout the world, and the settlement of new lands, reverses the trend, and up to the end of the century the terms of trade move in favour of the industrial countries. From then until 1913 they were stationary. The post-war period showed a violent movement in favour of manufacture till 1921, followed by a pronounced reaction till 1929, followed by another violent movement of the terms of trade against primary produce.

The movements of the terms of trade in the course of the trade cycle will repay further investigation. Rather remarkably, it appears that the peak (maximum employment and commodity prices) of the trade cycle is always associated with a turning point in the terms of trade, but that this turning point is sometimes a maximum and sometimes a minimum. Maximum (most in favour of manufacture) terms of trade were found in 1866, 1873, 1890 and 1900, and minimum in 1825, 1839, 1847, 1857, 1882, 1929 and 1937. The trade cycle peaks of 1907 and 1920 preceded in each case by one year maxima in the terms of trade.

Data for a long period are also available [1] for France, based first on 1827 and then on 1862. Reducing to the 1862 basis we have :

Years	Import Prices	Export Prices	Ratio
1827	81·4	96·2	118·0
1847–50	76·6	84·0	109·5
1851–59	92·7	104·6	113·0
1860–69	95·1	94·8	99·7
1870–76	91·5	78·6	85·9
1877–85	78·3	68·7	87·7
1886–93	66·5	63·0	94·7

Like England, France suffered an adverse movement

[1] Computed by de Foville and published in *Économiste Français*. More recent figures computed by Flux, *J.R.S.S.*, 1900, p. 482.

during this period, though less violent. The low figure for 1870–76 may be due to the efforts made to pay the war indemnity during this period. After this date there was a favourable movement.

For Germany, a series over the period 1891–1911, of the ratio of the prices of imported food ÷ prices of manufactured exports, is quoted by Slater:[1]

1891	138	1902	100
1892	131	1903	95
1893	129	1904	99
1894	113	1905	103
1895	111	1906	104
1896	106	1907	109
1897	100	1908	110
1898	109	1909	121
1899	99	1910	107
1900	100	1911	116
1901	102		

The terms of trade moved strongly in Germany's favour during the first part of the period, but the adverse movement after 1903 is also strongly marked.

Dr. Slater also quotes figures for India. The ratio of export to import prices (1890–95 = 100) was:

1895–96	104	1904–5	102
1896–97	104	1905–6	108
1897–98	100	1906–7	116
1898–99	103	1907–8	106
1899–1900	99	1908–9	104
1900–1901	102	1909–10	109
1901–2	103	1910–11	118
1902–3	103	1911–12	118
1903–4	104		

From 1927 to 1937 figures of export and import prices in all the principal countries are given in the League of Nations *Review of World Trade, 1937*, and a certain amount of information for earlier years is given in previous issues. It happens that 1927 and 1937 were both years at or near the maxima of favourability to agriculture of the terms of trade, and therefore the

[1] *Economica*, 1924, p. 193.

movement between these years gives us some idea of the long-period trend. The following table shows the ratio

$$\frac{\text{Export prices 1937} \div \text{Export price 1927}}{\text{Import prices 1937} \div \text{Import prices 1927}},$$

i.e. a high value indicates a favourable trend of the terms of trade and *vice versa*. Figures are also given for 1933, the point of the trade cycle in general most unfavourable to agricultural countries.

TERMS OF TRADE
(1927 = 100)

	1933	1937		1933	1937
U.S. America	137·8	128·9	Hungary	78·2	91·1
Germany	139·2	114·3	Canada	75·5	89·3
France	118·9	113·7*	Chile	82·7	89·1
Finland	91·6	110·7	Yugoslavia	71·3	89·0
Great Britain	122·3	107·3	Ireland	92·3	87·8
South Africa (exc. gold)	84·3	101·2	Denmark	82·5	78·1
			Italy	97·0	67·7
Norway	103·2	100·3	Dutch East Indies	68·6	67·2
Latvia	61·6	94·1			
Estonia	79·0	91·8	Japan	81·9	60·5

* 1936. The figure for 1937 has fallen to about 103, consequent on the devaluation of the currency.

The violence of the swing of the terms of trade in favour of the industrial countries between 1927 and 1933 is very marked: perhaps more striking is the extent to which this has been retained during the rising phase of the trade cycle 1933–37. Finland and South Africa are remarkable in that the prices of their products have risen especially since 1933. On the opposite side of the table, primary producing countries lost heavily between 1927 and 1933, and recovered part of their losses between 1933 and 1937. The extent of this recovery, it will be noted, was much greater among the partially industrialised countries. In a number of countries the terms of trade have continued to deteriorate since 1933. The exceptionally adverse terms of trade of Italy and Japan

should not be lost sight of in assessing the economic position of those countries. In Japan's case the very heavy devaluation of the yen has helped to worsen the terms of trade, apart from the low price of raw silk, which is Japan's chief export.

These violent movements of the terms of trade have been accompanied also by considerable relative movements in the quantities of goods traded and produced. The following table consists of data rearranged from *Review of World Trade* and *World Production and Prices*:

	Quanta in Milliard I.U.								
	1929	1930	1931	1932	1933	1934	1935	1936	1937
Foodstuffs:									
World production . .	36 8	37 5	36 8	36 7	37 3	37 3	37 2	38 0	38 8
World trade (exports) .	6 92	6 78	6 65	6 15	5 75	5 68	5 91	6 09	6 44
Output consumed within country of production .	29 9	30 7	30 2	30 5	31 5	31 6	31 3	31 9	32 4
Sterling prices (1929=100)	100 0	84 5	71 4	72 2	66 9	67 1	67 6	69 5	75 9
Raw Materials and Semi-finished Goods:									
World production . .	17 15	16 09	14 40	12 80	13 84	14 93	16 25	18 20	20 42
World trade (exports) .	10 40	9 83	9 20	8 48	9 10	9 15	9 52	9 93	11 60
Output consumed within country of production	6 75	6 26	5 20	4 32	4 74	5 78	6 73	8 27	8 82
Sterling prices (1929=100)	100 0	82 0	63 4	61 0	58 7	63 9	66 0	68 6	76 6
Manufactured Goods:									
World production . .	69 8	61 5	55 0	48 0	54 1	59 5	67 3	77 3	88 1
World trade (exports) .	12 00	10 53	9 11	7 06	7 25	7 97	8 33	8 98	10 30
Output consumed within country of production .	57 8	50 0	45 9	40 9	46 9	51 5	59 0	68 3	77 8
Sterling prices (1929=100) .	100 0	94 0	83 7	88 9	82 2	80 8	80 2	79 3	85 8

World production of foodstuffs and raw materials computed by League of Nations at American 1930 prices, converted into I.U. by the ratios which American wholesale prices of foodstuffs and raw materials in 1930 bear to the 1925–34 average (on 1925–34 base foodstuff prices were 106·0, raw materials 101·4, semi-manufactured goods 97·8). World industrial production is given as an index number, but no base value is given. Woytinski in *Les Conséquences sociales de la crise* estimates the world value of industrial production in 1929 at $77 milliards at 1928 prices, or 69·8 milliard I.U. (conversion on the basis of movements of the American price index for finished goods).

Gold values converted to sterling at current rate of exchange.

"Quanta" of trade are given at 1929 prices which are converted to I.U. by a similar formula. On a 1925–34 basis food prices in 1929 were 116·8, raw materials 117·1, semi-manufactures 112·2 and manufactures 108·7. The world's export total of $33·02 milliards

in 1929 is divided among the three classes of goods in accordance with data in *Review of World Trade, 1937*, p. 78, and the 1929 dollars then re-expressed as I.U.

Between 1929 and 1933 the manufacturer reduced his sterling prices only by 18 per cent, while the price of foodstuffs fell by 33 per cent and of raw materials by 41 per cent. The quantum of food traded cannot vary greatly, owing to the comparatively constant productivity of nature on the one hand and the comparatively constant demands of the human stomach on the other hand; the quantum of raw materials traded depends fairly closely on the quantum of industrial production; and therefore the only remaining free variable in the international trading equilibrium is the quantum of trade in manufactures. This fell by 40 per cent between 1929 and 1933, while the quantum of trade in foodstuffs fell by 18 per cent and in raw materials 13 per cent. In the case of both foodstuffs and manufactures, it will be noticed, output for consumption within the country of production increased much more rapidly (or fell less rapidly) than output for export. In raw materials, between 1929 and 1932, the reverse was the case (largely due to the heavy drop in the quantum of raw materials produced and consumed within the U.S.A.). As between 1929 and 1937, however raw materials and semi-finished goods produced for use within the country of production rose in volume by 31 per cent; produced for export, by only 12 per cent. In 1929, 61 per cent of the world's output of these goods was exported; in 1932, 66 per cent; in 1937, only 57 per cent.

The quantum of production of raw materials throughout this period has remained at about 24 per cent of the quantum of manufacturing production, which provides some check on the validity of the statistics. The volume of the world's manufacturing production fell by 22 milliards between 1929 and 1932, of which 17 milliards was accounted for by the decline in production for internal consumption and only 5 milliards by declining production for export.

This table shows how the movement towards autarky has been intensified both by the severity of the last depression and by the violence of the movement of the terms of trade against primary producing countries. In these countries, with the very low prices of basic materials then prevailing, the low wages, and the dearness of imported manufactures (often accentuated by tariffs and exchange depreciation) there was every incentive towards the rapid industrialisation of hitherto non-industrial countries. As a result, the degree of international specialisation has been greatly reduced, and industry has been spread much more widely over the world than it was before.

Nothing in the evidence so far adduced necessarily shows that this process will continue. But it may be confidently predicted that any further severe depression, or further movement of the terms of trade adversely to primary producers (such movements are often the result of monopolistic price policy on the part of manufacturers in the industrial countries), will lead to further growth of industry in primary producing countries. Only a restoration of high prices for primary produce (relative to manufactures) will prevent it. In view of the clear evidence of agricultural over-population in nearly every country in the world, and of the great technical economies yet possible in agricultural production, this latter seems an unlikely contingency.

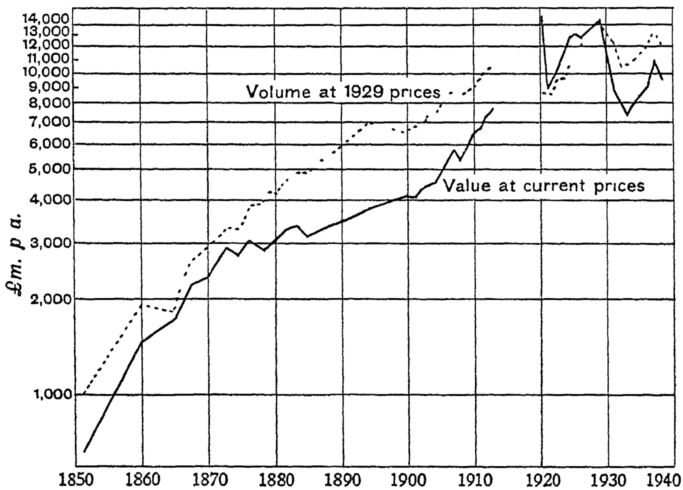
For this reason it seems unlikely that the volume of world trade will again surpass (by any considerable amount) the 1929 level. World trade in 1929 was at a very high peak. We may at this point turn back to the examination of the figures of the trend of world trade as a whole.[1]

Professor Neumann-Spallart in 1885 might have looked back (though so far as we know he did not) over the past decade of comparatively normal economic fluctuations and drawn a trend line from this decade's

[1] 1860–85, Neumann-Spallart, 1886–96, Neuling, *Welt. Arch*, April 1933; 1900–1923, Statistisches Reichsamt; 1913–38, League of Nations.

experiences. If he had projected this trend line into the future he could have predicted the volume of world trade in 1929 with almost complete accuracy. What he could not have foreseen was that certain factors (enumerated above) were going to reverse this trend after 1929.

The fairly steady discrepancy between the world's total of imports and of exports can be explained — indeed more than explained — by shipping earnings which were estimated to amount to £485 millions in 1928.[1] Part of this total represents passenger fares and coast-



wise earnings, reducing it to somewhere near the observed discrepancy. Exact agreement should not be expected owing to different methods of valuation and time taken by goods in transit.

Full insight into the factors controlling the volume and terms of world trade cannot be obtained without reference to items in the balances of payments other than mere commodity movements. In each country's balance of payments there are also imports and exports of certain services such as shipping, insurance, etc., and each country is a net creditor or debtor in respect of

[1] *World Economic Survey, 1933–34*, p. 216.

WORLD TRADE (£ MILLION) AT CURRENT RATES OF EXCHANGE

Years	Imports	Exports	Total	Do, at 1929 Prices *
1851	336	305	641	997
1860	..	..	1428	1903
1865	..	..	1742	1861
1867–68	1154	1034	2188	2552
1869–70	1207	1090	2297	2795
1872–73	1539	1322	2861	3295
1874–75	1432	1277	2709	3310
1876	1478	1522	3000	3925
1878	1494	1348	2842	3976
1879	1557	1343	2900	4265
1880	1557	1467	3024	4230
1881	1692	1498	3190	4610
1882	1778	1546	3324	4805
1883	1798	1561	3359	4952
1884	1713	1507	3220	4957
1885	1629	1427	3056	4980
1886–90	..	..	3350	5650
1892–96	..	..	3852	6890

Year	Total	Do, at 1929 Prices
1900	4,025	6,610
1901	4,030	6,775
1902	4,140	6,770
1903	4,410	7,150
1904	4,560	7,335
1905	4,955	7,960
1906	5,460	8,520
1907	5,890	8,730
1908	5,390	8,240
1909	5,820	8,540
1910	6,430	9,050
1911	6,810	9,950
1912	7,520	10,400
1913	7,840	10,710
1920 †	4,220	8,580
1921 †	9,250	8,520
1922 †	9,840	9,500
1923 †	10,430	9,710

Year	Imports	Exports	Total	Do, at 1929 Prices
1913	4310	4032	8,342	11,380
1924	6570	6295	12,865	10,690
1925	6800	6495	13,295	11,730
1926	6585	6162	12,747	12,010
1927	6925	6489	13,414	12,970
1928	7110	6735	13,845	13,415
1929	7305	6795	14,100	14,100
1930	5968	5447	11,415	13,110
1931	4587	4167	8,754	12,065
1932	3982	3678	7,660	10,520
1933	3756	3539	7,295	10,630
1934	3986	3771	7,757	11,020
1935	4207	3975	8,182	11,550
1936	4460	4284	8,744	12,100
1937	5555	5264	10,819	13,670
1938 (On basis of first 6 months)	4950	4600	9,550	12,250

* Revalued by Dr. Schlote's combined index number for British imports and exports

† Values in gold pounds (Stat. Reichsamt)

interest and dividend payments on private and public capital in the country owned by outsiders, or outside the country owned by its citizens. After all these factors have been taken into account there remains "Balance of Payments on Current Account", or, for convenience of reference, the "Balance". If this is positive, the country concerned must be increasing its net holding of assets abroad, or reducing its indebtedness — if negative, increasing its indebtedness or reducing its assets — by exactly the amount of the balance, except in so far as a positive balance is used to import gold, or a negative balance is offset by the export of gold.

The movement of the balances of payments of the creditor countries has been a dominating but not fully appreciated factor in the cycle of events since 1929, and in determining the movements of the terms of trade. The League of Nations in *Review of World Trade* specifies the following eight countries as creditor countries, namely U.S.A., Great Britain, France, Holland, Belgium, Switzerland, Sweden and Ireland. Dividing the world into creditor and debtor countries we have (table opposite):

All data from *Review of World Trade, 1937*, and *Balances of Payments,* except trade figures for 1927, 1928, 1930, 1931 recalculated from original sources; gold production from *League of Nations Statistical Year Book*; balances of payments for Holland from Statistisches Reichsamt; and for Switzerland from *Economist,* 21st April 1934. Aggregate interest and services in creditor countries' balances of payments computed from following incomplete data, see tables on p. 465.

MILLIONS OF GOLD DOLLARS
(Pre-1934 Parity)

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938 on Basis of First Nine Months (Gold Data for Eleven Months)
Merchandise transactions.												
Creditor countries—												
Imports	14,465	14,517	15,409	12,810	9,850	6434	5806	5310	5380	6040	7308	6082
Exports	12,936	13,339	13,467	10,648	7,237	4792	4306	4211	4188	4396	5455	4926
Balance	−1,529	−1,178	−1,942	−2,162	−2,613	−1642	−1500	−1099	−1192	−1644	−1853	−1156
Debtor countries—												
Imports	19,299	20,135	20,186	16,265	10,945	7535	6652	6670	6847	7103	8914	8029
Exports (inc gold)	18,580	19,389	19,557	15,829	11,669	8093	7409	7092	7366	8181	9914	8300
Balance	−719	−746	−629	−436	+724	+558	+757	+422	+519	+1078	+1000	+271
Other items in creditor countries' balance of payments												
Interest and dividends	2,398	2,410	2,435	2,335	1,755	1169	1057	943	1011	1074	1127	(1100)
Services	1,243	1,330	1,620	1,411	691	78	484	483	344	342	439	(375)
Net balance (sum of above items and merchandise balance)	2,112	2,562	2,113	1,584	−167	−395	41	325	153	−228	−287	(319)
Gold imports into creditor countries	−140	37	386	767	804	1081	332	1077	383	659	1100	1107
Remainder of balance, i e net flow of capital from creditor to debtor countries	2,252	2,525	1,727	817	−971	−1476	−291	−752	−230	−887	−1387	−904
Gold production in debtor countries	340	352	361	380	404	439	467	494	545	601	641	
Net increase (+) or reduction (−) in stocks of gold in debtor countries	+480	+315	−27	−387	−400	−642	+135	−583	+162	−58	(−359)	

In 1927 and 1928 capital was flowing into the debtor countries at the rate of over 2 milliard dollars per year. Already by 1929 this flow had been considerably reduced, and the effects were beginning to make themselves apparent in falling prices of primary produce. But it appears to be the case that the intensity of the slump in the prices of primary produce in 1930–32 was largely due to the fact that not only did this flow of lending cease, but was followed by an actual flow of repayment. The obligation to make these repayments during the worse years of the depression imposed an intolerable strain both on the productive and financial systems (those repayments were largely made in gold) of the debtor countries.

We can put this another way. In 1927 the creditor countries had claims for interest and dividends amounting to $2398 millions, but they were content to "lend back" $2252 millions of this, requiring a net payment from the debtor countries of only $146 millions' worth of goods, services and gold. This was discharged as follows:

Excess of imports over exports of merchandise into creditor countries		1529
Less		
Excess of imports over exports of services into debtor countries	1243	
Excess of imports over exports of gold into debtor countries	140	
		1383
		146

By 1929 interest claims had risen to $2435 millions and the creditors would only lend back $1727 millions, leaving a balance of $708 millions to be found. Debtors paid $386 millions of this in gold, and the remainder by increasing their exports and reducing their imports.

In 1930 and 1931 the situation rapidly deteriorated. By 1932 interest and dividend claims were $1169 millions.

Interest and Dividends

($ million)

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Britain	1217	1217	1217	1071	771	526	530	511	538	603	642
U.S. America	679	680	699	769	621	455	325	220	207	195	..
France and colonies	..	..	..	..	..	46	72	98	141	150	147
Belgium	..	..	53	..	..	..	..	..	19	25	..
Ireland	..	..	..	..	26	..	20	19	16	17	..
Switzerland	..	64	..	..	39	29	..	..	..	..	..
Holland	..	..	..	..	..	45	48	41	49	..	..
Sweden	5	7	8	5	– 2	24	13	10	13	12	14

Services

($ million)

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Britain	1066	1095	1139	944	608	302	341	352	314	359	499
U.S. America	– 572	– 684	– 681	– 580	– 493	– 504	– 218	– 169	– 175	– 235	..
France and colonies	..	..	..	..	..	157	168	121	63	64	125
Belgium	..	..	134	..	..	..	..	..	44	40	..
Ireland	..	..	..	..	23	..	31	26	24	25	..
Switzerland	..	84	..	..	56	48	..	..	..	..	..
Holland		..	..	..	..	75	60	50	46	..	..
Sweden	52	51	56	52	46	31	26	22	24	26	33

The creditors not only refused to re-lend any of this, but demanded that a further $1476 millions of capital should be repaid, in the depths of the depression. (If a creditor acted like this in private life, no words would be too hard for him, but when great nations do these things in their collective capacity, they pass almost unnoticed.) Thus in 1932 the debtors had to find $2645 millions, whereas in 1928 there was a net inflow of new money from the creditors of $115 millions. The debtors met this situation first by raising their gold exports from $37 millions to $1081 millions, and the rest simply by compelling their imports to fall faster than their exports. In this cruel instability of the international debtor-creditor relationship we have an explanation of an important part of recent economic fluctuations.

Since 1932 the old re-lending relationship has not been resumed. The flow of capital has been continuously back into the creditor countries. Their desire is to liquidate their foreign assets; the debtor countries' desire is to build up foreign assets. So long as these tendencies continue, there will be strong forces working against any improvement in the terms of trade for primary producers.

It seems to be fairly clear from the data that a period of active international lending on the part of the industrial countries is associated with terms of trade beneficial to primary produce, and *vice versa*. Apart from the striking history of the last decade, the period of improving terms of trade for primary produce, 1896–1914, was associated with a very great rate of international lending, while the period of deteriorating terms of trade, 1876–96, was associated with a decline in international lending. Much theoretical study has been devoted to the problem of how terms of trade should respond to changes in the flow of capital. These data seem to suggest that the problem can best be studied on a world-wide scale rather than for any particular country, and they also appear to suggest a reason for it.

Taking a long view, during a period of sustained

international lending, resources are likely to be on the whole thereby diverted away from primary production. In the lending countries these resources will go to the provision of goods for export and, in the borrowing countries, to the construction of public works and the installation of capital assets of all kinds. The cessation of this flow forces resources back into primary production in both lending and borrowing countries. And the demand for primary produce being very inelastic, this tends to force down its relative value. This, of course, represents a long-period analysis. In 1936 and 1937 an improvement in the terms of trade of the primary producing countries was actually accompanied by an *inflow* of capital into the creditor countries. But this was a purely temporary phenomena due to the rapidity of the increase of world trade and commodity prices at that time, and signs of a capital outflow from the creditor countries are once again appearing on a more promising scale than at any time since 1930.

This prompts the reflection as to whether the world may not again be entering upon an era of long-period upward trend in commodity prices similar to that of 1896–1914, though at a more moderate rate, in view of the forces enumerated above.

For a long-period upward trend of commodity prices both experience and theory indicate that the following three conditions are necessary :

(*a*) a fairly rapid increase in gold production ;
(*b*) low interest rates (at least at the start) ; and
(*c*) considerable international lending and a rising quantity of international trade.

During the 1920's high interest rates and stationary gold production both exerted a downward pressure on commodity prices. International lending, though active, was on a much smaller scale than before 1914. The cessation of international lending after 1928 largely accounted for the universal severity of the slump.

For the next few years we can be fairly certain that

interest rates will be kept at a low level, while gold output will increase at a still more rapid pace. If we are not sure about the third factor, namely, a rise in international trade and lending, we have now a fourth factor, which the world has not had on previous occasions, exerting an upward pull on commodity prices, namely, a universal unbalancing of budgets on a scale never previously contemplated. In fact, even the prospects for international trade also look better now than they have for some years.

With all these conditions favourable, it may be surmised that the world is now entering a phase of rising commodity prices, and that the setback of 1937 was only temporary. We must naturally watch with care the still tender growth of international lending, though it is a mistake to think that this will be checked by war scares. Between 1900 and 1914 most far-sighted men were apprehensive of war, but this did not prevent (it might even have helped) the fact that these years constituted the greatest period of international lending that the world has known.

We should not expect a rise in commodity prices either as marked or as prolonged as that of 1895–1914, if only for the reason that population in the consuming countries is now rising much more slowly. Apart from this, two further factors might check and reverse the trend. One is a sudden return to balanced budgets by European countries. The second is that the U.S. Treasury may lower the price of gold (as it threatened in 1937); though it would stand to lose by the sudden slump in commodity prices which would follow. Failing these eventualities, a moderate rise may be expected for some years.

The anticipated rise in commodity prices is unlikely to affect commodities such as wheat and sugar, where productive capacity is greatly in excess of the world's needs. But it should affect other foodstuffs and, still more, industrial materials of all kinds.

Such a rise in general commodity prices is, however,

unlikely to be accompanied by any strong movement of the terms of trade in favour of primary production. On balance, it may be anticipated that the terms of trade will move only slightly in this direction, or remain about stationary.

CHAPTER XV

THE RELATION BETWEEN INVESTMENT AND INCOME

THE mutual relationships between investment and income have been the subject of intensive theoretical study during recent years. If this book were a systematic treatise on modern theory, these problems might occupy the opening chapters. That they come last in this book is not meant to detract from their importance, but rather to indicate that they key together a number of other problems hitherto discussed separately: unemployment and under-utilisation of productive capacity discussed in Chapter III, the consequent nullification of economic progress discussed in Chapter IV, the distribution of incomes discussed in Chapter XII, the propensities of consumption and saving as income increases discussed in Chapter XIII, and the marginal productivity of capital, and proportions of national incomes saved, discussed in Chapter XI.

It is clear that the interactions between investment and income are mutual, and for convenience we may adopt the terminology introduced by Mr. R. F. Harrod (in his book *The Trade Cycle*): all phenomena in which income movements are causal and investment consequential are summarised under the title of the *Relation*, and all phenomena in which investment is causal and income movements consequential are summarised under the title of the *Multiplier*. Mr. Harrod was not thinking of long-period phenomena when he made this distinction, and in the present writer's opinion he much over-simplified the short-period situation so far as the relation is concerned. Nevertheless it is helpful to use Mr. Harrod's characterisation both in long-period and short-period analysis.

The relation, according to Mr. Harrod, took a simple

form. There was a simple functional relationship between the rate of change of the volume of production of consumption goods, and the amount of investment. Statistical analysis by Professor Tinbergen has shown that the situation is in reality far more complex. The volume of investment in each type of capital is determined by a different equation. Current rates of profits, prices of capital goods relative to consumption goods, the volume of capital goods of that type already in existence, the rate of interest and the lapse of time, all have to be taken into account. Professor Tinbergen has already achieved remarkable success in "explaining" fluctuations in investment by means of such equations, and it appears that further triumphs may be expected. At present we need only note that Professor Tinbergen's equations, while mainly constructed to explain short-period movements, have a wider validity, and generally speaking are just as true for the long period. The factors above enumerated still determine the volume of investment.

The multiplier hypothesis also was originally conceived as a short-period hypothesis but may be equally true in the long period. This hypothesis, which is abundantly verified below, examines the marginal propensity to consume as income rises, and hence deduces the increment of national income consequential upon an increment of investment. The cause of long-period depression of employment and of national income below the level of potential productive capacity is to be sought (apart from the question of occupational maladjustment) in a long-period level of investment inadequate to absorb the community's full potential savings which become available when its productive capacity is fully utilised.

Mr. Harrod sought virtually to explain the whole trade cycle in terms of the relation and the multiplier, and familiarised us with the idea of income acting upon investment and investment acting upon income simultaneously. The temptation to embark, at this stage of

the book, on a trade-cycle discussion, must be resisted. But mention may be made of a brilliant recent synthesis by Dr. E. A. Radice (*Econometrica*, 1939). Using a Tinbergian analysis, he finds investment in Britain to be largely determined by the level of profits, with a time lag. He examines marginal propensities to save and hence deduces a multiplier, and on this simple basis is able to build up a mathematical expression which shows a cyclical movement of national income, with a period of about eight years. This is a most encouraging result. Nevertheless, it would appear on *a priori* grounds that a complete mathematical theory of the trade cycle must also take into account the short-period trend of real marginal labour costs per unit of output, and also the long-period gluttability of certain wants, or "real" factors in the trade cycle.[1]

The remainder of this chapter is devoted to a detailed analysis of the multiplier and information bearing on it. The "relation" group of phenomena have become the special field of Professor Tinbergen and his fellow workers, who have far outstripped any possibility of amendments or comment. Their work will probably be remembered as the statistical achievement *par excellence* of this generation.

The multiplier hypothesis [2] may be stated in the form that there is a linear relationship between the rate of investment and the level of national income:

$$(\text{National Income}) = \text{Constant} + r\ (\text{Rate of Investment}),$$

where the coefficient r is described as the multiplier.

[1] See for instance Professor D. H. Robertson's evidence to the MacMillan Committee

[2] In England this hypothesis was first put forward by Mr. Kahn (*Economic Journal*, June 1931) and re-stated by Mr. Keynes (*General Theory*, 1936). An official calculation of the multiplier in relation to public works programmes was made for Germany (*Wirtschaft und Statistik*, November 1933), and a similar calculation was made for Roumania by Manoilesco (*Weltwirtschaftliches Archiv*, March 1935), where a value of 4 is obtained. The first statement of the multiplier hypothesis appears to have been that made (in a simple form) by Professor Giblin in *Australia, 1930*.

This equation refers to the money value of national income and to the money value of gross investment, the latter including all production of investment goods for replacement and maintenance purposes, any net addition to stocks, and any net positive balance of oversea trade. Instead of stating the equation in terms of money income, we can state it in terms of real income or in terms of employment, but the money income formulation is more accurate and convenient.

The theoretical reasoning behind this relationship is quite simple. The basic assumption is that of any increment of national income, a fraction c will be spent and a fraction $1-c$ will be saved. (Foreign trade is brought into consideration at a later stage.) Now let the rate of spending on investment goods increase by 1 unit. There will be a corresponding rise in the incomes of producers. Of this increment $1-c$ will be saved, and c spent on consumption goods, causing a further increment in producers' incomes.

Altogether it appears that producers' incomes will be increased by

$$1+c+c^2 \ldots\ldots = \frac{1}{1-c}.$$

The value $1/1-c$ gives the multiplier r, which may be defined as the *increase in national income consequential upon an increase of one unit in investment.*

A substantial Government deficit, met by borrowing, should for this purpose be added to investment, for it has exactly the same effect in generating new incomes. It may be asked why over-spending of incomes by private persons should not also be included here, but the answer is that expenditure by private individuals is generally much more closely and determinately related to their incomes than is expenditure by Governments.

For a country where foreign trade is important, we take into account the fact that, of an increment of income of one unit, c will be spent on home-produced consumption goods and services, m spent on imports, and the

balance $1 - m - c$ saved. With c thus re-defined, we again have

$$r = \frac{1}{1-c}.$$

In this case all exports must be regarded as generating new incomes, in the same way as investment or Government deficits. Where, however, the ratio of foreign trade to national income is low, as in the U.S.A., it is sufficient merely to take the surplus of exports over imports and to include this surplus with investment.

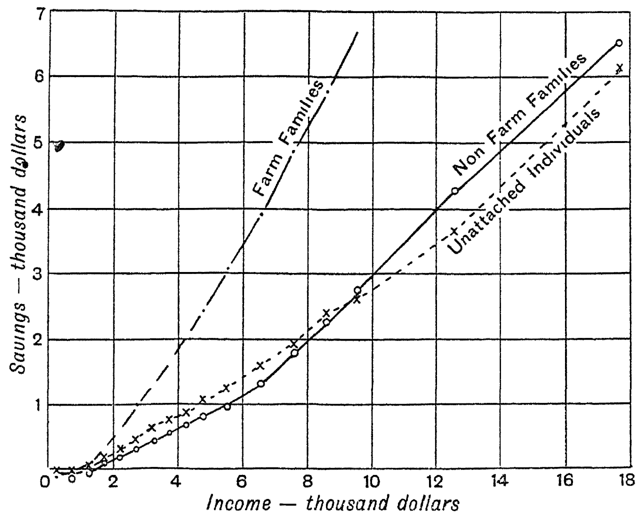
It is for the U.S.A. that the best verification of this hypothesis can be obtained. The following diagram consists of data taken from *America's Capacity to Consume*, indicative of the amounts saved at different levels of income. Separate curves are drawn for non-farm families, farm families and unattached individuals, who at the time of the inquiry held 75 per cent, 8 per cent and 17 per cent of the national income respectively.

In the case of farm families the slope of the line is fairly constant at about 0·5, and in the case of unattached individuals is also fairly constant at about 0·3. That is to say, of each £100 increase of income, a farmer will probably save about £50 and an unattached individual about £30. The figures for non-farm families vary somewhat according to income :

$	
0–3000	·170
3000–8000	·284
8000 upwards	·480
Weighted average	·308

Giving non-farm families a weight of 0·75, farm families a weight of 0·08 and unattached individuals a weight of 0·17, we obtain a final average of 0·322 as representing the general " marginal propensity to save " of the American population as a whole. The multiplier in this case should be

$$\frac{1}{1-c} = \frac{1}{0{\cdot}322} = 3{\cdot}11.$$



A considerably more refined approach to the same problem is made by R. and W. M. Stone (*Review of Economic Studies*, October 1938). Where C represents consumption and Y income, they fit equations of the form

$$\log C = a + b \log Y + c\,(\log Y)^2,$$

thus allowing scope for two curvatures and obtaining a practically perfect fit, instead of having to break up the data into rough groups as is done above. The individual marginal propensity to consume is then given by

$$\frac{dC}{dY} = \frac{(b - 2\,c \log Y)\; Y^{(b - c \log Y - 1)}}{\text{antilog } a},$$

and the marginal propensity to consume for the community as a whole is obtained from a weighted average, where y is the aggregate income in any income-group

$$\frac{\Sigma\left(y\,\dfrac{dC}{dY}\right)}{\Sigma y}.$$

From this formula they obtain results for U.S.A. similar to those obtained above, and also for Germany.

MARGINAL PROPENSITY TO CONSUME

U S America :	
Farm families	·50
Non-farm families	·67
Unattached individuals	·69
Total	·67
Germany	·73

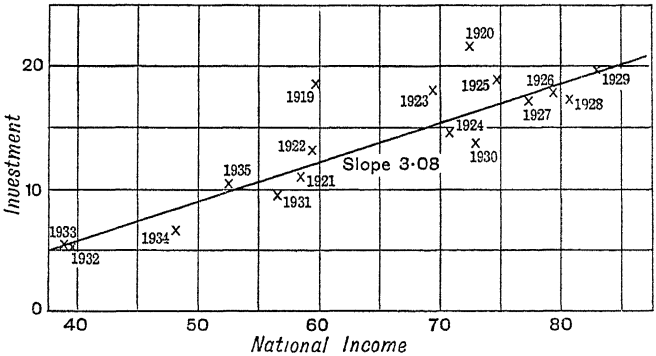
The multiplier hypothesis can first be tested by examining the relationship between national income and total investment in the U.S.A. A scatter diagram is prepared in which movements of money income are compared with movements of gross investment for the period 1919–35. Both data are taken from *National Income and Capital Formation.* Figures of gross capital formation (inclusive of changes in inventories and net surplus of exports) are taken rather than figures of net investment, because the latter sometimes becomes negative and is subject to a certain arbitrariness in the estimation of depreciation. The net deficit or surplus of all Governmental authorities in the U.S.A. is computed and the deficit added to gross investment (not including in the deficit sums spent on permanent construction which will already have been included in the figures of gross investment).

With the exception of the data for the first two years, a freehand line can be drawn through the points, which are found to be closely determined by a multiplier of value 3·08 (slope of line drawn freehand). This corresponds exceedingly closely to the value of 3·11 determined *a priori.*

The validity of this relationship can be re-expressed in a different form, if we say that the data give us justification for saying that the marginal propensity to save tends to remain constant for fairly long periods, and hence changes in investment and changes in national income will be in determinate relationship to each other. In the case of the U.S.A. it is clear that the years 1919 and 1920 were part of a different epoch, in which a given

level of national income was associated with a higher absolute total of savings and investment.

Year	(Milliards of dollars)			
	Net National Income	Gross Investment	Surplus (+) Deficit (−)	Investment + Deficit
1919	59 9	19·3	+0 6	18·7
1920	72·4	22·1	+0·6	21·5
1921	58·3	11·5	+0·5	11·0
1922	59·7	13·3	+0·4	12·9
1923	69·7	18·2	+0·5	17·7
1924	70·4	15·2	+0·3	14·9
1925	74·8	19·2	+0·5	18·7
1926	79·5	19·0	+1·0	18·0
1927	77·4	18·2	+0·9	17 3
1928	80·4	17·8	+0·5	17·3
1929	83·4	20·3	+0·6	19·7
1930	72·9	13·7	−0·3	14·0
1931	56·0	8·5	−1·4	9·9
1932	39·6	3·1	−2·1	5·2
1933	39·3	4·3	−1·0	5·3
1934	47·8	6·1	−0·7	6·8
1935	53·0	9·0	−1·4	10·4



R. and W. M. Stone fit an equation

$$C = a + bY + cT,$$

where C represents consumption, Y income and T time, fitted to the time-series data by the method of least

squares. From this they deduce alternative values of the marginal propensity to consume and the multiplier. Using Dr. Kuznetz's data for 1919–35, they obtain by this method a multiplier of 3·3.

It seems to be fairly firmly established, therefore, that the failure of national income in the United States to rise over the last twenty years must be largely attributable to the failure of investment to rise, marginal propensity to save being given. If the marginal propensity to save were reduced, this would not cause a shift in the absolute level of the line, but would make its slope steeper. It would require a less total of investment to bring the national income up to any desired maximum under these circumstances; but, on the other hand, the consequences of any instability in the rate of investment would be even more disastrous. To alter the position of the line would require a change in the absolute rather than in the marginal propensity to save. If some social or economic change took place in the United States, reducing the average savings of, say, a $4000 a year income from $600 to $300; or if there were a change in the distribution of incomes, putting a larger proportion of the national income in the hands of poorer people who would naturally save less; then either of these changes would make it possible for the existing rate of investment in the U.S.A. to "support" a much greater national income. With the present distribution of income and absolute and marginal propensities to save, a national income of $100 milliards (which figure is estimated to represent America's full productive capacity) can only be obtained by gross investment of $25 milliards a year, much higher than the extravagant peak reached in 1928.

The information given in Chapter XI makes clear the declining opportunities in the U.S.A. for the older types of investment, and shows that large-scale investment in that country in the future must be of the dwelling-house or public utility type. That is, any control of economic policy in the U.S.A. will have to decide whether to meet

the present situation by reducing propensity to save or increasing incentive to invest; if it is decided upon the latter, it is only within a limited field that further large-scale investment will be found possible. Investment in both dwelling-houses and public utilities is, however, very sensitive to changes in the rate of interest, and a reduction in the rate of interest in the U.S.A. might make it possible to attain full employment of productive resources.

In Great Britain the situation is more complex owing to the much greater relative amount of oversea trade. It appears also that during the last ten years there has been some change in the marginal propensity to save, which has fallen. As has been pointed out also in Chapter XI, the absolute propensity to save has also been showing a downward tendency.

A detailed examination of the applicability of the multiplier to British income statistics is made in the *Economic Journal* of September 1938. The marginal propensity to save is not in this case computed from family budget statistics as in the U.S.A., but from the following empirical relationships:

(1) Marginal distribution of an increment of national income between wages and profits.
(2) Short-period relationships between consumption and income statistics.

The marginal propensity to save is found to be 0·311, and to import 0·17. We thus obtain a multiplier of 2·082 applicable to any change in gross investment, exports or deficit. Any such increment of income tends to cause a consequential increase of imports of $0{\cdot}17 \times 2{\cdot}082$ or 0·354, with certain further consequences.

It is found that, allowing for a change in the marginal propensity to consume which took place in 1933, this multiplier gives a very satisfactory explanation of recent short-period fluctuations in British national income. For the period 1929–35, R. and W. M. Stone, by their method, obtain a multiplier of 2·1.

For Germany we have the official calculation made in 1933 (*Wirtschaft und Statistik*, November 1933). This calculation, however, was made under depression conditions and gives a multiplier much lower than that which would be expected to prevail in a normal period. The results give a multiplier lying somewhere between 1·25 and 1·72. The factors keeping the multiplier low were that out of each 100 marks of investment expenditure it was computed that 30 marks would represent a saving to the Government of unemployment benefit, 9 marks an increase of tax revenues and 11 marks an increase in industrial profits. It was assumed that each of these items would be devoted entirely to saving or to the reduction of debt, and would not be spent further.

From the figures of the amount of saving at different income levels computed by Wagemann and quoted above, a very different result is obtained. The marginal propensity to save works out at 0·274 only,[1] giving a multiplier of 3·65. If we take into account, however, the fairly substantial marginal propensity to import at that date (Wagemann's figures refer to 1928), we obtain a much lower value of the multiplier.

When an empirical examination is made of the national income and investment figures, the results for a number of years appear to lie along a line with a slope of about 1·83. This line closely defines the data for the years 1925 and 1932–37 inclusive. For the years 1926–1928 (and again apparently for 1938) the data lie along a line of similar slope but below the lines previously obtained. For the years 1929–31 national income was much higher than was computed from the investment multiplier. This may represent a condition of "excessive spending" and the piling up of debts abroad (see the results given below for Australia in 1929–30 and Hungary in 1926–29).

The situation here is not so simple as in the U.S.A. or in Great Britain. R. and W. M. Stone interpret the

[1] Result obtained by approximate analysis: agrees exactly with result obtained by R. and W. M. Stone applying full formula.

data for 1925–32 as consistent with a marginal propensity to consume of 0·72, as shown in Wagemann's figures, and a multiplier of 3·6. From 1932 to 1937 they put the multiplier[1] at 1·7 (1·83 is deduced from the freehand line drawn in the diagram on p. 483). This resembles the higher result of the official estimate of the multiplier made in 1933. In other words, savings on unemployment benefit and increases in industrial profits are now disposed of in a way which gives rise to no new demand for consumption goods, as was assumed to have been the case under depression conditions in 1933.

A successful application of the multiplier to Australian national income statistics was made in *The National Income of Australia.* In this case the marginal

Year	(Milliard reichsmarks)		
	National Income	Investment	Investment + Deficit
1925	60·0	5·6	6·1
1926	62·7	3·9	4·6
1927	70·8	8·3	8·3
1928	75·4	8·8	10·0
1929	75·9	4·3	5·1
1930	70·2	0·9	1·4
1931	57·5	−2·9	−2·4
1932	45·2	−3·1	−2·3
1933	46·6	0·2	0·0
1934	52·7	3·3	3·3
1935	58·6	5·1	5·1
1936	64·9	8·5	8·5
1937	71·0	11·2	11·2
1938	76·0	11·5	11·5

propensity to save was computed to be 0·23 from examination of statistics of the State of Queensland, and this same figure was then assumed for Australia as a whole. The marginal propensity to import was obtained

[1] More recent calculations (privately communicated) indicate that this figure of 1·7 is too low.

by comparison of movements of national income and imports over a period of years, which were found to be in linear relationship, giving a marginal propensity to import of 0·25. This leaves a marginal propensity to consume home-produced goods and services of 0·52, giving a multiplier of 2·08. This multiplier is applied to the total of exports, investment and deficits. The multiplier successfully predicted the course of national income between 1928–29 and 1936–37, with the exception of the one year 1929–30. Here actual national income was very much higher than national income computed by the multiplier. As in the case of Germany, this was probably also due to the level of consumption being abnormally high in relation to income, which probably persisted until financial reserves were exhausted.

Other countries for which R. and W. M. Stone calculate the multiplier by their method of time series analysis are

Holland, 1923–33	1·9	Sweden, 1896–1916	4·9
Poland, 1928–36	3·4	„ 1923–30	2·5

The low figure for Holland can be accounted for by a high marginal propensity to import, but the high figure for pre-war Sweden is very surprising.

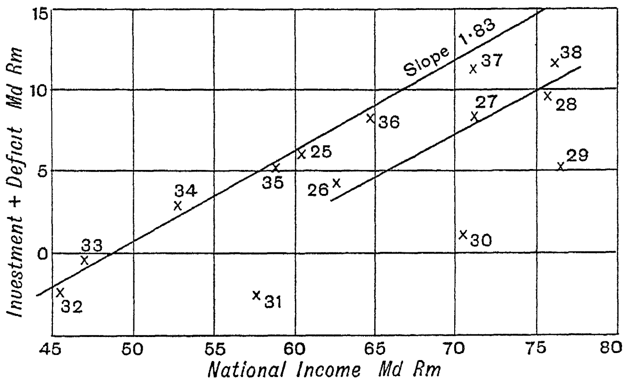
The only other country for which a calculation has been made is Roumania (Manoilesco, *Weltwirtschaftliches Archiv*, 1935). Out of 100 units of investment outlay, Manoilesco estimates that the disposal will be

Wages	52·5	Imports	12·5
Taxes	30	Savings	5

On the assumption that a small proportion of the tax receipts will go to reduction of deficits and that the remainder will be spent, he reaches the conclusion that the marginal propensity to consume home-produced goods and services is 0·75, and consequently the multi-

plier will be 4. No data are available to test this hypothesis.

The Hungarian statistics should finally be quoted as a case of *exceptio probat regulam.* In the years 1926–29 net savings (internal investment less capital imports) dropped to zero, but national income continued to increase rapidly. During the depression years the level of savings again became positive but national income declined heavily. Here also it appears, as in the case of Germany and Australia, that the financial ease resulting from a rapid inflow of foreign capital leads to an excessive propensity to consume which may raise national



income at a time when investment is low. In Hungary, however, this seems to have been carried to much greater lengths than in either of the other two countries.

Apart, however, from the abnormalities which arise in borrowing countries, we may generalise that, in the majority of countries which are creditor countries or which are only borrowing on a moderate scale, the level of investment does always in the short period and sometimes in the long period exercise a determining influence on the level of national income. We must not, however, make the mistake of regarding these relationships as permanent. In the long run what matter are the absolute and marginal propensities to consume. A country only needs a high level of investment to

maintain its national income at a reasonable level if its inhabitants tend to save heavily out of any given aggregate income. Whether they do this or not depends largely on the equality with which this income is distributed.

APPENDIX

The economic welfare of the country is intimately associated with the size of the national dividend, and changes in economic welfare with changes in the size of the dividend. We are concerned to understand, so far as may be, the nature of these associations. To this end an essential preliminary is to form clear ideas as to what precisely changes in the size of the dividend *mean*. It will be convenient, in the first instance, to postulate that the size of that group whose dividend we are studying remains unchanged.

The dividend is an objective thing, consisting in any period of such-and-such a collection of goods and services that flow into being during the period. Since it is an objective thing, we should naturally wish, if we were able, to define changes in the size of it by reference to some objective physical unit, and without any regard to people's attitude of mind towards the several items contained in it. I do not mean that changes in public tastes would be thought of as incapable of affecting the size of the national dividend. They are obviously capable of affecting it by causing changes in the objective constituents of the dividend. I mean that, *given those objective constituents*, the size of the dividend should depend on them alone, and not at all on the state of people's tastes. This is the point of view which everybody intuitively wishes to take.

If the national dividend consisted of one single sort of commodity only, there would be no difficulty about this. Everybody would agree that an increase in the size of the dividend should mean an increase, and a decrease a decrease in the number of units of this commodity. In like manner, if the dividend consisted of a number of different commodities, but the quantities of all of them always varied in equal proportions, there would be no difficulty. The dividend would at any time consist of a certain number of complex units, each of them made up of so much of each commodity, and increases and decreases in the dividend would mean increases and decreases in the number of these complex units.

In actual life, however, the national dividend consists of a number of different sorts of things, the quantities of some of which are liable to increase at the same time that the quantities of others are decreasing. In these circumstances there is no direct means of determining by a physical reference whether the dividend of one period is greater or less than that of another; and it becomes necessary to

seek for a definition along other lines. Plainly the definition chosen must be such that, supposing the dividend consisted of one sort of thing only, we should always be able to say that an increase in the quantity of this thing constituted an increase in the size of the dividend. A definition that did not admit of this would be paradoxical. From this starting-point we are led forward as follows. Considering a single individual whose tastes are taken as fixed, we say that his dividend in period II is greater than in period I if the items that are added to it in period II are items that he *wants more* than the items that are taken away from it in period II. Passing to a group of persons (of given numbers), whose tastes are taken as fixed, and among whom the distribution of purchasing power is also taken as fixed, we say that the dividend in period II is greater than in period I if the items that are added to it in period II are items *to conserve which they would be willing to give more money than they would be willing to give to conserve the items that are taken away from it in period II.*

This definition is free from ambiguity. However the technique of production has altered, — though it has become more costly to make one thing and less costly to make another, though it has become possible to make some entirely new things and at the same time impossible to make some things that used to be made before, — it can yield one conclusion, and one only, as to the effect on the size of the national dividend of any change in its content that may have taken place. If, then, tastes and the distribution of purchasing power were really fixed, there would be nothing to set against the advantages of this method of definition. It would be the natural and obvious one to adopt.

As a matter of fact, however, tastes and the distribution of purchasing power both vary. The consequence of this is that our definition leads in certain circumstances to results which, in appearance at least, are highly paradoxical. Thus in period I tastes are such and such, and in period II they are something different; in period I the dividend is a collection C_1 and in period II a collection C_2. It may happen both that the group with period I tastes would give *less* money for the items added in period II than for the items subtracted in that period, and also that the group (of equal numbers) with period II tastes would give *more* money for the items added in period II than for the items subtracted in that period. In this case our definition makes C_2 both less than C_1 and also greater than C_1; which is a violent paradox. The only escape from this is to admit that, in these circumstances, there is no meaning in speaking of an increase or decrease in the national dividend in an absolute sense. The

dividend decreases from the point of view of period I tastes, and increases from the point of view of period II tastes; and there is nothing more to say.[1] It is easy to see the same paradox may arise, and the same solution be forced upon us, when the distribution of purchasing power alters between period I and period II Here, again, we can only speak of an increase (or decrease) in the size of the dividend from the point of view of period I distribution or from the point of view of period II distribution: we cannot speak of an increase or decrease in any absolute sense.

We are thus confronted with the awkward fact that there are likely to be certain changes in the constitution of the national dividend, of which it is not possible to say that they are either increases or decreases in an absolute sense. Plainly there is serious objection to a definition which leads to this result. On the other hand, though it will rarely happen that a modification of the dividend, which constitutes an upward (or downward) change of so much per cent from the point of view of period I, will constitute an equal percentage change from the point of view of period II, if between these two periods tastes or distribution have altered, yet it will, we may reasonably expect, *usually* constitute a change *in the same direction* from the point of view of period II. Most causes, in short, will increase the dividend from both points of view or diminish it from both points of view. Usually, therefore, we can say, without circumlocution or complicated reference to two points of view, that a given cause either has or has not increased the size of the national dividend.

[1] An exactly analogous difficulty emerges when we attempt to compare the size of the national dividend, as defined above, in two countries.

Thus, if the German population with German tastes were given the national dividend of England, they might get less economic satisfaction than before; while, if the English population with English tastes were given the German national dividend, they also might get less economic satisfaction than before. The proposed definition would, in these circumstances, compel us to say both that the English dividend is larger (from the English point of view) than the German dividend, and also that the German dividend is larger (from the German point of view) than the English dividend. It may be added, though the point is not strictly relevant, that differences in comparative tastes between the people of two countries can sometimes, though not always, be detected by statistical methods. For example, Germans before the war would not eat mutton, though it was a penny cheaper than pork, while Englishmen ate it readily. Again, Germans eat rye bread, whereas English people eat white bread. We know that this is not due merely to the fact that rye bread is relatively cheap in Germany and that Germans are poorer than Englishmen, because, if it were cheapness alone that was responsible for the consumption of rye in Germany, there would presumably be a higher consumption of white bread among better-to-do Germans. This, however, is not found. Hence, we may legitimately infer that Germans have a taste for rye bread, as against wheaten bread, different from the English taste.

The defect in our definition is thus not a fatal defect. Moreover, continued detection fails to reveal any other definition that is not even more defective. In spite, therefore, of all that has been said, I propose, for the purposes of this volume, to define an increase in the size of the dividend for a group of given numbers as follows. From the point of view of period I, an increase in the size of the dividend is a change in its content such that, *if* tastes in period II were the same as those prevailing in period I, and *if* the distribution of purchasing power were also the same as prevailed in period I, the group would be willing to give more money to conserve the items added in period II than they would be willing to give to conserve the items that are taken away in period II. Waiving the distinction, discussed in Chapter II, between desire and the satisfaction that results when a desired thing is obtained, we may state the above definition alternatively thus. From the point of view of period I, an increase in the size of the dividend for a group of given numbers is a change in its content such that, *if* tastes in period II were the same as those prevailing in period I, and *if* the distribution of purchasing power were also the same as prevailed in period I, the economic satisfaction (as measured in money) due to the items added in period II is greater than the economic satisfaction (as measured in money) due to the items taken away in period II. From the point of view of period II, an increase in the dividend is defined in exactly analogous ways. From an absolute point of view, an increase in the size of the dividend is a change which constitutes an increase from both the above two points of view. When, of two dividends, one is larger from the point of view of one period and the other from that of the other, the two are, from an absolute point of view, incommensurable.

The discussion of the preceding chapter has provided us with a *criterion* by which to decide whether the national dividend of one period is larger or smaller than the national dividend of another period from the point of view of one or other of the periods. But to provide a *criterion* of increases and decreases in the size of anything is not to provide a *measure* of these changes. We have now to study the problem of devising an appropriate measure.

Our *criterion* of increase from the point of view of any period being that, with the tastes and distribution of that period, the money demand for the things that have been added to the dividend exceeds the money demand for the things taken away from it, it is natural to suggest that we should employ as a *measure* of increase, from the point of view of the period, the proportion in which the aggregate money demand for the things contained in the dividend of that

period (in the sense of the amount of money that people would be willing to give rather than do without those things) exceeds the aggregate money demand for the things contained in the dividend of the other period. A measure of this kind would conform exactly to our criterion. We should have two figures, one giving the change from the point of view of the tastes and distribution of period I, and the other that from the point of view of the tastes and distribution of period II. Plainly, given the criterion decided upon in the last chapter, this is the measure that we should adopt if we were able to do so.

Unfortunately, however, this type of measure is altogether impracticable. In the way of it there stands, as a final obstacle, the fact that the aggregate money demand for the things contained in the dividend of any period, in the sense explained above, is an unworkable conception. It involves the money figure that would be obtained by adding together the consumers' surpluses, as measured in money, derived from each several sort of commodity contained in the dividend. As Marshall has shown, however, the task of adding together consumers' surpluses in this way, partly on account of the presence of complementary and rival commodities, presents difficulties which, even if they are capable of being overcome in theory by means of elaborate mathematical formulae, are certainly insuperable in practice.[1] Even apart from these remoter complications, it is evident that no measure of the kind contemplated could be built up which did not embrace among its terms the elasticities of demand for the various elements contained in the dividend, or, more exactly, the forms of the various demand functions that are involved. These data are not, and are not likely, within any reasonable period of time, to become accessible to us. Any type of measure which involves the use of them must, therefore, be ruled out of court.

Continuing along the line of thought which this consideration suggests, we are soon led to the conclusion that the only data which there is any serious hope of organising on a scale adequate to yield a measure of dividend changes, are the quantities and prices of various sorts of commodities. There is nothing else available, and, therefore, if we are to construct any measure at all, we *must* use these data. Our problem then becomes: in what way, if at all, is it possible, out of them, to construct a measure that will conform to the definition of changes in the size of the dividend that was reached in the last chapter? An attempt to solve this problem falls naturally into three parts: first, a general inquiry as to what measure would conform most nearly to that definition if all relevant information

[1] *Principles of Economics*, pp. 131-2, footnote.

about quantities and prices were accessible; secondly, a mathematical inquiry as to what practicable measure built up from the sample information about quantities and prices that we can in fact obtain would approximate most closely to the above measure; thirdly, a mixed general and mathematical inquiry as to *how reliable* the practicable measure, as an index of the above measure, is likely to be.

In attacking the first and most fundamental of these issues, we have to admit at once that complete success is unattainable. According to the definition of the last chapter, the national dividend will change in one way from the point of view of a period in which tastes and distribution are of one sort, and in a different way from that of a period in which they are of another sort. In order to conform with this, our measure of change would need to be double, being expressed in one figure from the point of view of the first period, and, if tastes and distribution were different in the two periods, in another figure from the point of view of the second period. A measure built up on quantities and prices only cannot possibly answer to this requirement. For, though we may know the quantities and prices that actually ruled in period I, when tastes and distribution were of sort A, and the quantities and prices that ruled in period II, when tastes and distribution were of sort B, we cannot possibly know either the quantities and prices which would have ruled in period II, if tastes and distribution had then been of sort A. Hence, the utmost we can hope for is a measure which will be independent of what the state of tastes and distribution actually is in either of the periods to be compared, but which will always increase when the content of the dividend has changed in such a way that economic welfare (as measured in money) would be increased whatever the state of tastes and distribution, provided only that this was the same in both periods. Even if the whole of the data about quantities and prices were accessible to us, it would be impossible to construct a measure, based on these data alone, conforming more closely than this to our definition; and, plainly, this degree of conformity is very incomplete.

So much being understood, let us turn to the problem of constructing from full data a measure — we may call it from henceforth the full-data measure — that will conform as closely as possible to the modest ideal specified in the preceding section. What is required is a measure which will show increases in the size of the dividend whenever its content is changed in such a way that, in terms of the money of either period, for a group of given size with constant tastes and distribution, the money demand for the items that have been added is greater than the money demand for those that have been

subtracted; or, in other words, that the economic satisfaction (as measured in money) obtained by the group in the second period is greater than it was in the first period. It is not, of course, required that, if, when the excess of economic satisfaction (as measured in money) is E, our measure shows an increase of 1 per cent, it shall, when the excess of economic satisfaction (as measured in money) is 2E, show an increase of 2 per cent. This is not only not necessary, but, in the special case of a dividend consisting of one sort of commodity only, it would even lead to paradoxical results. It is required, however, that when the excess of economic satisfaction (as measured in money) is more than E, it shall show a greater increase than it does when the excess is E. This is the framework within which our construction must be made. The problem is to discover what construction will best fulfil the purpose that has been specified.

In the first of any two periods that we wish to compare any group of given size expends its purchasing power upon one collection of commodities, and in the second on a different collection. Each collection must, of course, be so estimated that the same thing is not counted twice over, that is to say, it must be taken to include direct services rendered to consumers—e.g. the services of doctors, finished consumable articles, and a portion of the finished durable machines produced during the year, but not the raw materials or the services of labour that are embodied in these things, and not, of course, "securities". Let us, at this stage, ignore the fact that in one of the collections there may be some newly invented kinds of commodity which are not represented at all in the other. The first collection, which we may call C_1, then embraces $x_1, y_1, z_1 \ldots$ units of various commodities; and the second collection, C_2, embraces $x_2, y_2, z_2 \ldots$ units of the same commodities. Let the prices per unit of these several commodities be, in the first period, $a_1, b_1, c_1 \ldots$; and, in the second period, $a_2, b_2, c_2 \ldots$ Let the aggregate money income of our group, in the first period, be I_1, in the second I_2. The following propositions result:

(1) If our group in the second period purchased the several commodities in the same proportion in which it purchased them in the first period, that is to say, if it purchased in both periods a collection of the general form C_1, its purchase of each commodity in the second period would be equal to its purchase of each commodity in the first period multiplied by the fraction

$$\frac{I_2}{I_1} \cdot \frac{x_1a_1 + y_1b_1 + z_1c_1 +}{x_1a_2 + y_1b_2 + z_1c_2 +}.$$

(2) If our group in the first period purchased the several com-

modities in the same proportion in which it purchased them in the second period, that is to say, if it purchased in both periods a collection of the general form C_2, its purchase of each commodity in the second period would be equal to its purchase of each commodity in the first period multiplied by the fraction

$$\frac{I_2}{I_1} \cdot \frac{x_2a_1 + y_2b_1 + z_2c_1 + \ldots}{x_2a_2 + y_2b_2 + z_2c_2 + \ldots}.$$

On the basis of these propositions, provided that a certain assumption is made, our problem can be partially solved.

If in period II a single man who had been purchasing a collection of the form C_2, i.e. made up of elements in the proportions (x_2, y_2, z_2 ...), chose instead to purchase a collection of the form C_1, it is certain that his action would leave prices unchanged, so that he could buy the items in his new collection at prices a_2, b_2, c_2, . . . An analogous proposition holds of a single man in period I who should choose to shift from a collection of form C_1 to one of form C_2. But, when it is the whole of a group, or, if we prefer it, a representative man, who shifts his consumption in this way, it is no longer certain that prices would be unaffected. If the group in period II shifted from a collection of form C_2 to one of form C_1, it would have to pay, let us suppose, prices a_1', b_1', c_1'. In like manner, if the group in period I shifted from a collection of form C_1 to one of form C_2, it would have to pay prices a_2', b_2', c_2'. The assumption referred to at the end of the preceding section is that $(x_1a_1' + y_1b_1' + z_1c_1' + \ldots)$ is equal to $(x_1a_1 + y_1b_1 + z_1c_1 + \ldots)$ and that $(x_2a_2' + y_2b_2' + z_2c_2' + \ldots)$ is equal to $(x_2a_2 + y_2b_2 + z_2c_2 + \ldots)$. This means that the group in period II could then, if it chose, buy as much of a C_1 collection, in spite of the shift of prices caused by its decision to do this, as it would have been able to do had that decision caused no shift of prices ; and that an analogous proposition holds of the group in period I. If all the commodities concerned were being produced under conditions of constant supply price, the above assumption would conform exactly to the facts. In real life, with a large number of commodities, it is reasonable to suppose that the upward price movements caused by shifts of consumption would roughly balance the downward movements ; so that, in general, our assumption will conform approximately to the facts. It is important to remember, however, throughout the following argument, that this assumption is being made.

Let us begin with the case in which both the fractions set out above lie upon the same side of unity ; they are either both greater than unity or both less than unity. If they are both greater than unity, this means that our group, if it wishes, can buy more com-

modities in the second period than in the first, whether its purchases are arranged in the form of collection C_1 or in that of collection C_2. Hence the fact that in the second period it chooses the form C_2 proves that the economic satisfaction (as measured in money) yielded by what it then purchases in the form C_2 is greater than the economic satisfaction (as measured in money) that would be yielded by a collection of the form C_1 larger than the collection of that form which it purchased in the first period. *A fortiori*, therefore, it is greater than the economic satisfaction (as measured in money) that would be yielded by the actual collection of the form C_1 which it purchased in the first period. But since tastes and distribution are unaltered, the economic satisfaction (as measured in money) that would be yielded by the actual collection C_1 in the second period is equal to the economic satisfaction (as measured in money) that was yielded by the actual collection in the first period. Hence, if both our fractions are greater than unity, it necessarily follows that the economic satisfaction (as measured in money) yielded by the collection C_2 bought in the second period is greater than the economic satisfaction (as measured in money) yielded by the collection C_1 bought in the first period. By analogous reasoning it can be shown that, if both the above fractions are less than unity, the converse result holds good. In these circumstances, therefore, either of the two fractions

$$\frac{I_2}{I_1} \cdot \frac{x_1a_1 + y_1b_1 + z_1c_1 \ldots}{x_1a_2 + y_1b_2 + z_1c_2 \ldots} \quad \text{or} \quad \frac{I_2}{I_1} \cdot \frac{x_2a_1 + y_2b_1 + z_2c_1 +}{x_2a_2 + y_2b_2 + z_2c_2 +},$$

or any expression intermediate between them, will satisfy the condition set out above, which our measure is required to fulfil as a criterion of changes in the volume of the dividend.

In the above circumstances, therefore, the condition we have laid down does not determine the choice of a measure, but merely fixes the limits within which that choice must lie.

If
$$\frac{I_2}{I_1} \cdot \frac{x_1a_1 + y_1b_1 + z_1c_1 + \ldots}{x_1a_2 + y_1b_2 + z_1c_2 + \ldots}$$

is less than unity by a large fraction, this means that, were our group to purchase in the second year a collection of the form C_1, its purchases of each item would be less by a large percentage than they were in the first year, and therefore — tastes and distribution being unchanged — it would probably enjoy an amount of satisfaction less than in the first year by a large amount, say by K_1. The fact that, instead of doing this, it purchases in the second year a collection of the form C_2, proves that the satisfaction yielded by its purchase

of this collection in the second year does not fall short of that yielded by its purchase of the other collection in the first year by more than K_1. In like manner, if

$$\frac{I_2}{I_1} \cdot \frac{x_2a_1 + y_2b_1 + z_2c_1 + \ldots}{x_2a_2 + y_2b_2 + z_2c_2 + \ldots}$$

is greater than unity by only a small fraction, this means that, were our group to purhase a collection of the form C_2 in the first year, its purchases of each item would be less by only a small percentage than they are in the second year, and — tastes and distribution being unchanged—it would probably enjoy an amount of satisfaction less than in the second year by only a small amount, say K_2. Hence, the satisfaction yielded by the collection actually purchased in the second year does not exceed that yielded by the collection actually purchased in the first year by more than K_2. Since, therefore, in view of the largeness of K_1 relatively to K_2 there are more ways in which the satisfaction from the second year's purchase can be less than there are ways in which it can be more than the satisfaction from the first year's purchase, and since, further, the probability of any one of these different ways is *prima facie* equal to that of any other, it is *probable* that the satisfaction from the second year's purchase is less than that from the first year's. Hence the satisfaction — it will be understood that we are speaking of satisfaction as measured in money — obtained by our group *probably* decreases or increases in the second period according as either

$$\frac{I_2}{I_1} \cdot \frac{x_1a_1 + y_1b_1 + z_1c_1 \quad \ldots}{x_1a_2 + y_1b_2 + z_1c_2 + \ldots} \times \frac{I_2}{I_1} \cdot \frac{x_2a_1 + y_2b_1 + z_2c_1 + \ldots}{x_2a_2 + y_2b_2 + z_2c_2 + \ldots}$$

or any power of this expression, or any other formula which moves more or less as it does, is greater or less than unity. Any fraction constructed on these lines will, therefore, *probably* satisfy the conditions required of our measure.

The results thus obtained fix the limits within which the choice of an approximate measure must lie Since, however, they still exhibit an indefinite number of possible measures, any one of which would satisfy the fundamental condition that has been laid down, they do not *determine* the choice of that measure. We have, therefore, to take a further step and to choose among many eligible formulae the one we deem *most* eligible. In this choice, which is necessarily more or less arbitrary, it is proper to make use of the two fundamental tests of technical excellence in price index numbers — for, of course, the measure we are seeking is simply the reciprocal of a price index number multiplied by the proportionate change that has taken place

in money incomes — which Professor Irving Fisher has recently made prominent. First, the formula chosen should be such that "it will give the same ratio between one point of comparison and the other point, no matter which of the two is taken as base".[1]

If, calculated forward, it shows that in 1910 prices were double what they were in 1900, it must not, as a so-called unweighted arithmetical index number of the Sauerbeck type would do, show, when calculated backwards, that in 1900 prices were something other than half what they were in 1910. Secondly, the formula chosen should obey what Professor Fisher calls the factor-reversal test. "Whenever there is a price of anything exchanged, there is implied a quantity of it exchanged, or produced, or consumed, or otherwise involved, so that the problem of an index number of *prices* implies the twin problem of an index number of quantities . . . No reason can be given for employing a given formula for one of the two factors which does not apply to the other."[2] Hence, the formula chosen should be such that, assuming the aggregate money values of all the commodities we are studying to have moved between two years from E to $(E+e)$, then, if the formula, as applied to prices, gives an upward movement from P to $(P+p)$ and, as applied to quantities, an upward movement from Q to $(Q+q)$,

$$\left(\frac{P+p}{P}\cdot\frac{Q+q}{Q}\right) \text{ is equal to } \frac{E+e}{E}.$$

Besides conformity with these tests we may also properly require in our measure simplicity of structure and convenience of handling. These various considerations taken together point, on the whole, to the formula

$$\frac{I_2}{I_1}\cdot\sqrt{\frac{x_1a_1+y_1b_1+z_1c_1+\ldots}{x_1a_2+y_1b_2+z_1c_2+\ldots}\times\frac{x_2a_1+y_2b_1+z_2c_1+\ldots}{x_2a_2+y_2b_2+z_2c_2+\ldots}}$$

as the measure of change most satisfactory for our purpose. The portion of this expression to the right of I_2/I_1 is the reciprocal of that form of price index number to which Professor Fisher, approaching the problem from an angle quite different from mine, assigns the first prize for general merit, and which he proposes to call "the ideal index number".[3]

The successful employment of the above formula depends, it will be observed, upon the assumption that no commodities are included in either of the collections C_1 and C_2 which are not included in both.

[1] *The Making of Index Numbers*, p. 64.
[2] *Loc. cit.* pp. 72 and 74.
[3] *Loc. cit.* p. 242.

If, therefore, a commodity is available for purchase in one of the two years but not in the other, the satisfaction yielded by this commodity in the year in which it is purchased is wholly ignored by our measure. So far then as "new commodities" are introduced between two periods which are being compared, that measure is imperfect. This matter is important, because new commodities, in the sense here relevant, embrace not merely commodities that are new physically, but also old commodities that have become obtainable at new times or places, such as strawberries in December, or the wheat which railways have introduced in parts of India where it was formerly unknown.

Obviously, we must not count December strawberries along with ordinary strawberries, and so make inventions for strawberry forcing raise the price of strawberries, but must reckon December strawberries as a new and distinct commodity. Since, however, new commodities seldom play an important part in the consumption of any group till some little while after they are first introduced, the imperfection due to this is not likely to be very serious for comparisons between two years that are fairly close together. We can ignore the existence of the new commodities and confine our calculations to the old ones without serious risk of invalidating our results. As between distant years, however, in the later of which a great number of important commodities may be available that did not exist at all in the earlier ones, a measure that ignored new commodities would be almost worthless as a gauge of changes (as defined in the preceding chapter) in the size of the national dividend. Unless, therefore, some way can be found of bringing these things into account, the hope of making comparisons over other than very short intervals must, it would seem, be abandoned. A way out of this impasse is, however, available in the chain method devised by Marshall. On this method, the price level of 1900 is compared with that of 1901 on the basis of the commodities available in both those years, new commodities introduced during 1901 being ignored; the price level of 1901 is then compared with that of 1902, the new commodities of 1901 this time being counted, but those of 1902 ignored; and so on.

We now turn to the second main problem of this chapter. The formula set out above is the best measure for our purpose that could be devised. But it cannot be employed in practice, because, in order to construct it, a great deal of information would be necessary which is never in fact available. It is, therefore, necessary to construct, from such information as we can obtain, a model, or representative, measure that shall approximate to it as closely as possible. Our full data measure, apart from its multiplier I_2/I_1 representing change of income, is built up of two parts: the reciprocal of the price change

of the collection C_1 (containing quantities of different commodities equal to x_1, y_1, z_1 ...) and the reciprocal of the price change of the collection C_2 (containing quantities equal to x_2, y_2, z_2 ...). Our approximate measure will, therefore, also be built up of two parts constituting approximations to the price changes of C_1 and of C_2 respectively. By what use of the method of sampling can these approximations best be made ?

Let us next suppose that these difficulties have been so far overcome that a sample embracing both prices and quantities at all relevant periods is available The next problem is to determine the way in which the prices ought to be " weighted ". At first sight it seems natural that the weights should be proportioned to the quantities of the several commodities that are contained in the collection from which the sample is drawn. But, in theory at all events, it is sometimes possible to improve upon this arrangement. For some of the commodities about which we have information may be connected with some excluded commodities in such a way that their prices generally vary in the same sense. These commodities, being representative of the others as well as of themselves, may properly be given weights in excess of what they are entitled to in their own right. Thus, ideally, if we had statistics for a few commodities, each drawn from a different broad group of commodities, with similar characteristics, it would be proper to " weight " the prices of our several sample commodities in proportion, not to their own importance, but to that of the groups which they represent.

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THE END

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